

DUAS29

Posted on 24.04.2024 by Rupert Dent

Category: [Drone](#)

Report Title Unexpected move post-launch

Initial Report

The flight was planned to be a short-range flight (10m) with a hover to execute a maintenance cycle of a set of batteries for the DJI M30T. Preflight checks were carried out and the aircraft was powered up. Once the home point had been recorded, the pilot completed final checks and throttled the aircraft up to take off. Immediately on becoming airborne, the aircraft pitched forward and flew rapidly forwards for approximately 4 metres at high speed at a height of under 1m. It then appeared to brake of its own accord. Standard flight procedures involve initiating screen recording prior to take off so the incident was recorded on video. Additionally, the detailed flight logs have been examined and confirm that: a) the home point had been recorded; b) 20 satellites had been locked onto; and c) only the left stick (throttle) was moved by the pilot during this period. The pilot allowed the aircraft to stabilise and then immediately returned to the take off point and landed.

Playback of the screen recording suggests that in the 2 secs immediately prior to take off, the on-screen telemetry was showing a groundspeed of up to 1.5m/s, even though the aircraft was stationary. Because the pilot was carrying out airspace checks in this time, this anomaly was not apparent.

The latest firmware had been applied to the aircraft and controller 4 days earlier, and a total flight time of 90mins had been flown without issue.

Lessons learned: Pilots to confirm speed is registered as zero immediately before lifting and ensure no persons are within 5m of aircraft in any direction at take off / landing

Further Correspondence: There was some very helpful correspondence with the reporter that sheds additional light on what might have happened:

- Q. Were the vision sensors turned on? A. The vision sensors were on (by default)
- Q. What sort of levels of light were there? A. It was dusk, so low light levels.
- Q. If the sensors were switched on, what was the proximity activation distance set to? A. The warning distance was set to 15m, the braking distance was set to 2m.
- Q. How close was the pilot to the aircraft when it took off? A. The pilot was 6m away to the side of the drone.

Further analysis of the flight logs shows a 'horizontal speed' of between 1 and 3m/s being logged, even though the aircraft was stationary on the ground, in the seconds immediately before lifting off. The indicated direction of travel was backwards from the lat/long readings. The on-screen display and audio confirmed 20 GPS satellites and home position recorded, leading the pilot to conclude it was safe to take off.

My current working theory looking at the flight log data is that immediately on lifting off, the aircraft believed it was moving backwards, horizontally due to an inconsistent GPS signal. There was a wall approximately 6m behind take off point and so the obstacle avoidance system activated immediately and caused the aircraft to 'brake' by pitching heavily forwards. This can be seen in the 25 degree pitch recorded in the flight logs with no pilot input. The physical result was the drone moving rapidly forwards for around 4 metres.

Our pilots have been given extra guidance as follows:

- Ensure (as per the manufactures recommendations for the M30T) that no persons (including the pilot) are within 5m of the aircraft at take-off and landing.
- When taking off in the vicinity of obstacles within range of the obstacle avoidance system, extra care should be taken.
- A final check, immediately prior to taking off, should be carried out to confirm that sufficient GPS satellites are still available and the indicated speed is 0.0m/s

The pilot has logged over 200 flights on the M30T aircraft.

Comment

Vision sensors switched on and low light levels along with a low satellite count don't go well together! We know and have experienced how drones can move themselves a meter or two in the air without being commanded to do so when satellite count gets low or there is multipathing which results in low signal quality. If airborne in poor light, vision sensors intermittently see and then don't see a nearby obstruction. We recommend that where the number of satellites indicated on the controller at switch-on is inadequate, it is worth checking in the sub menus, to see the level of satellite reception and the signal quality, before starting the motors. In many of the latest drones, the number of satellites being received and the quality are indicated in the right hand top corner of the controller. Once the controller is switched on, the indicator displays a number and changes from red, to orange and then finally green. Once it is green, you are good to go!

With adjustable proximity-activation distances, if the pilot is too close to the aircraft on start up, it will normally give an aural warning. This is the moment to re-calibrate the activation distance as part of pre-flight checks and before take-off. As can be seen in this instance, if you have them set at say 10m but you are standing 5m from the aircraft on take-off, it may result in a forward movement of the aircraft if the proximity setting is switched to "avoid" rather than "brake", particularly if you

add being in an environment with low light levels to the mix as well. We would suggest a minimum distance of 10m between the pilot or an obstacle and the aircraft at takeoff rather than 5m. The reason is that it will give a little more time for the pilot to react, possibly switching into ATTI mode if appropriate, should they need to intervene quickly during takeoff if the aircraft starts doing something unexpected or unanticipated. Alternatively if an appropriate distance from fixed objects cannot be achieved, then it would be wise to consider moving to a better TOAL site entirely.



