

Fly-away after loss of control, DJI Matrice 210 V2, PH-6RJ

Amsterdam, 26 July 2022

The operator used the DJI Matrice 210 (M210) unmanned aircraft system (UAS) in the city of Amsterdam. The M210 has four propellers, each powered by its own motor.

The UAS was used for the third time this day. The operator had not experienced any problems during the previous flights that day and the setup of the UAS had remained unchanged. All three flights took place at different locations. The batteries were approximately 90% charged. The operator then had the UAS take off from a bridge for the flight controls check above the water at a height of about 5 to 6 metres above the takeoff location.³ Shortly after, the UAS stopped responding to instructions, which resulted in a fly-away. The UAS hit a tree and was severely damaged. At that moment, the message “ESC error” was visible on the screen of the remote controller. The operator tried in vain to stop the propellers. Smoke was billowing from one of the UAS motors. The operator then switched off the UAS and removed the batteries to prevent further damage and/or fire.

Weather data, provided by the operator, shows that, at the time of the occurrence, the surface wind came from direction 330 with a speed of 13 knots. There was no precipitation and no turbulence. The temperature was 19 degrees Celsius. The weather at the time of the occurrence does not appear to have contributed to its emergence.

³ This location was the result of a pre-flight risk assessment by the operator.

According to the flight data, a compass calibration had been performed before the previous flight. The crew did not perform a compass or IMU⁴ calibration prior to takeoff of the accident flight. This was in line with the guidelines in the User Manual of the M210 V2,⁵ which state to only calibrate when indicated by the UAS.

After takeoff, the yaw angle as determined by the magnetic compass started deviating from the yaw angle as determined by the IMU. Since the UAS operated in P-mode,⁶ this rendered the UAS uncontrollable and ultimately led to the crash.

The Dutch Safety Board requested the manufacturer of the UAS to analyse the flight data. According to the manufacturer, the deviation between the compass and IMU yaw was likely the result of electromagnetic interference (EMI),⁷ caused by the steel surrounding the bridge and the power lines present there.

DJI provides some flight environment requirements in its User Manual of the M210 V2, indicating that large metal structures may affect the on-board compass and GPS system. If flying in the vicinity of such objects is nonetheless performed, it is advised that crews pay special attention to the (risks of the) operating environment and choose the flight mode accordingly.

⁴ Inertial Measurement Unit.

⁵ DJI, MATRICE 200 SERIES V2, M210 V2/M210 RTK V2, User Manual v1.4, June 2019.

⁶ In P(ositioning)-mode, the UAS relies on global positioning system (GPS) and the magnetic compass.

⁷ Electromagnetic interference (EMI) is unwanted noise or interference in an electrical path or circuit caused by an outside source. EMI can cause electronics to operate poorly, malfunction or stop working completely.

In conclusion, it is most likely that the UAS was interfered by the operational environment, which resulted in the drifting away of the UAS.

The operator conducted an investigation into this occurrence and shared the results with the Dutch Safety Board.

Classification: Accident

Reference: 2022102

▼ *Archieffoto DJI Matrice 210 V2.*

