



Interagency Aviation SAFETY ALERT



No. IASA 23-02

Date: August 29, 2023

Page 1 of 2

Subject: Matrice 600 Pro Batteries - Thermal Expansion

Area of Concern: Safety and Security

Distribution: All Aviation Operations

Discussion: Recently, a USGS Uncrewed Aerial System (UAS) crew conducted an aerial photography mission in the Alamosa National Wildlife Refuge using a Matrice 600 UAS with a Yellowscan VX20-100 lidar scanner. The scanner weighs 6.8 pounds. On the last flight of the day, the Remote Pilot (RP) removed the batteries and noticed that one of the six batteries was hot and swollen, causing its plastic case to crack. The battery was allowed to cool, tagged as unusable, and removed from rotation. Refer to [SAFECOM 23-0786](#) for more information.



Figure 1 M600 UAS with a Yellowscan VX20-100 lidar scanner.



Figure 2 Cracked M600 Pro battery case.

The battery set was only used for a single flight that day. After each flight, the crew typically removes the batteries to let them cool down in a shaded, ventilated area. This step is vital before packing the batteries in their box/cases, as heat significantly affects the performance and longevity of lithium polymer (LiPo) batteries. In this case, the crew was unable to remove the batteries right away. The batteries remained in the UAS that remained in the sun. While the air temperature was approximately 83°F, objects can heat up considerably when exposed to direct sun.

The Remote Pilot (RP) noted that, while in flight, this set of batteries lost their charge a little faster than the previous sets. They were able to land safely as they monitored the flight for any further degradation.

Batteries swell when the electrolyte in the battery decomposes. In the case of LiPo batteries, the nature of the electrolyte tends to produce gasses such as carbon dioxide (CO₂) and carbon monoxide (CO) when they decompose. The layers of the battery are sealed in an airtight case. The production of these gases is what causes the LiPo battery to expand and swell.

A swollen battery is a sign that the battery is losing its ability to maintain a sufficient charge. LiPo batteries are constructed with thin layers that are coated with a chemical that contains lithium which becomes highly volatile when exposed to oxygen. Use caution with LiPo batteries that are compromised as they can pose a fire hazard!

Heat is the number one cause of a swollen battery. Other factors like totally depleting their charge, flying in high winds, or aggressive flying on a hot day can cause the internal temperature to spike.

DJI recommends the following maintenance procedures for the batteries:

- Store the batteries in a waterproof and moisture-proof area. If the battery is idle for more than 10 days, discharge the battery to 40% to 60% of the total battery level. Recharge and discharge the battery once every 3 months to maintain battery health.
- As the Matrice M600 Pro batteries get older, aircrews should continue to monitor them carefully and try to keep them out of the sun.

/s/ Keith Raley

Keith Raley
Chief, Aviation Safety, Training, Program
Evaluation, and Quality Management
DOI, Office of Aviation Services

/s/ Lori Clark

Lori Clark
Branch Chief
Aviation Safety Management Systems
USDA, Forest Service