

Report of Investigation

N183TD Occurrence – 3 August 2023

INTRODUCTION

The Quarter Scale Technology Demonstrator (QSTD) test program was developed by Supernal to perform hardware integration, software integration, and initial development and envelope-expansion testing to obtain learnings from engineering and operational perspectives. The accident occurred during an aircraft failsafe mode test using aircraft N183TD conducted on 3 August 2023 at the Supernal test site located in California City, California.

In addition to the pilot-in-command, the test flight was supported by a test director, ground control station operator, crew chief, and visual observer. The pilot, visual observer, and ground control station operator used hands-free headsets to maintain communication during the entire event, with no reported difficulties.

WRECKAGE INFORMATION

At 0802 PDT, the aircraft experienced a mechanical failure and subsequent loss of control while executing a simulated “Critical Low Battery” test point and fell from approximately 20 feet above ground level (AGL). The aircraft impacted the ground, causing damage to the landing gear, fuselage (most notably the canopy), interior avionics tray, and right lift-motor pylon. The avionics battery was thrown clear of the aircraft through an opening created by the broken canopy. There was no fire due to the impact. The aircraft sustained significant airframe damage and it was subsequently categorized as a Hull Loss.

AIRCRAFT INFORMATION

The SUP 83-1, FAA registration number N183TD, is a 25% subscale unmanned test aircraft used for the purpose of researching distributed electric propulsion technologies. The aircraft is configured with six propulsors driven by electric motors that are powered by lithium-ion battery packs. The aircraft is capable of performing vertical take-offs and landings and can transition to horizontal flight with lift being generated by the wings. The aircraft is controlled from a handheld 2.4Ghz/900Mhz (dual band) R/C transmitter by a remote pilot and monitored by a computer laptop ground station linked to the aircraft via 900Mhz telemetry radios. The ground station resides inside a temporary structure at the test site.

TEST SITE INFORMATION

The test site for this aircraft is a privately owned area near California City, CA, located within the Hyundai Motor Group’s California Proving Grounds automotive testing facility. Surrounded by unimproved desert, the test area has a large, paved ramp area from which operations are conducted along with the supporting infrastructure appropriate for the operations of the site. Per the Certificate of Authorization, issued by the FAA, SUP 83-1 is permitted to fly within its test area up to 400’ AGL, remaining clear of both KMHV’s controlled airspace and the Edwards Air Force Base Restricted Area 2515.

WEATHER INFORMATION

At the time of the accident, the weather was reported as: clear sky conditions; visibility 10 NM, temperature of 24 degrees centigrade, and variable winds at approximately 8 knots.

INVESTIGATION FINDINGS

The investigation revealed that the accident was caused by the failure of a single lift-motor (L3), which led to a loss of control. The motor failure was likely caused by a soldering defect that led to overheating and melting of a wire-solder joint, which led to a subsequent loss of electrical power to the L3 motor.

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