

National Transportation Safety Board

Office of Aviation Safety

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AIRWORTHINESS

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A. ACCIDENT

Location: Mt Baldy, CA
Date: September 24, 2022
Time: 0808 PDT
Helicopter: Bell 407, N

B. AIRWORTHINESS

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C. SUMMARY

On September 4, 2022, at 0808 Pacific daylight time, a Bell 407 helicopter, N687AM, was substantially damaged when it was involved in an accident near Mount Baldy, California. The pilot was seriously injured. The helicopter was operated as a Title 14 Code of Federal Regulations Part 91 flight.

The helicopter was being used to shuttle water and equipment in support of a local charity event. The pilot had completed four shuttle flights and was approaching the main, off airport landing zone to land when the low rotor RPM (revolutions per minute) warning sounded. He aborted the approach and attempted to increase power. The engine power did not recover, and the pilot performed an autorotation to a nearby road. The helicopter rolled upon landing, which resulted in substantial damage.

D. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

No pre-impact anomalies were observed in the airframe structure. The airframe exhibited damage as result of the impact and rollover to the right. The left and right end plates on the horizontal stabilizers were damaged and the bottom of the vertical fin exhibited upward crushing damage consistent with a nose high impact and hard contact of the tail stinger with the ground. The landing gear exhibited fractured forward and aft crosstubes at their right side saddle to skid connections consistent with overload impact forces from a slight right side impact. The aft crosstube was flattened significantly on the right side consistent with a nose high and right side low hard ground impact.

1.1 Flight Controls

No pre-impact anomalies were observed in the flight controls. The helicopter was equipped with single controls at the right side pilot station. The cyclic was moved freely in all quadrants with movement to the swashplate through the cyclic servos, therefore demonstrating cyclic control continuity. The left side cyclic bellcrank support at the left front of the main transmission exhibited a fracture consistent with overload impact forces. The collective stick was found stuck in an upward position and would not move freely by hand consistent with control linkage bending due to impact forces. However, when the collective stick was wiggled up and down by hand, corresponding movement was observed at the collective lever near the swashplate, demonstrating collective control continuity. The tail rotor anti-torque pedals were moved by hand and corresponding free pitch change was observed at the tail rotor blades, demonstrating tail rotor control continuity.

1.2 Fuselage/Cockpit

Appropriate Caution and Warning Panel (CWAP) lights illuminated when the battery switch was turned on. The throttle was found near the Off position and the fuel valve switch was found in the On position. The pilot seat restraints were intact. When the throttle was manipulated by hand, it could be felt that the throttle went into the FLY detent with light resistance. When the throttle was rotated upwards from FLY to the MAX NG position, the throttle could be felt going out of the FLY detent with light resistance. When the throttle was rolled down out of FLY towards IDLE, the feeling of rolling out of the detent could not be felt by hand.

The throttle was manipulated through various positions (OFF, IDLE, FLY, MAX NG, 48 PLA {Power Lever Angle}). The following observations were made at corresponding HMU pointer positions and PLA 1 sensor values from the FADEC as displayed on a computer that was plugged into the FADEC port in the cockpit. The HMU pointer positions and the PLA 1 sensor values on the FADEC correlated to the

various throttle positions that were checked. The PLA FLY position has a range of 62-70 degrees for proper governing to occur of the engine NG rpm (gas producer turbine rpm). Interrogation of the FADEC IR (Incident Recorder) recorded the PLA value of 48 degrees prior to the trigger fault. The trigger fault that commenced the recording of IR data was a torque rate exceedance, which is a typical fault when main rotor blades strike trees during impact. The throttle bezel position that matched the 48 degree PLA position on the FADEC was found to be approximately 1/8 inch below the 80 degree line on the bezel.

1.3 Fuel/Fuel System

No pre-impact anomalies were observed in the fuel system. During the wreckage examination, the fuel valve switch was turned to the Off position prior to checking the boost pump pressures on the instrument panel so that the fuel in the airframe fuel filter and engine fuel system was not disturbed prior to their examination. The fuel valve is located above the main fuel tank on the right side of the helicopter, just before the airframe fuel filter in the fuel system.

Both boost pump circuit breaker switches were Off prior to turning on the battery switch and checking their fuel pressures. The right boost pump was turned On and a pressure of approximately 10 psi was observed and the R/BOOST and TRANSFER caution lights both extinguished. The right boost pump was then turned Off. The left boost pump was then turned On and a pressure of approximately 10 psi was observed and the L/BOOST and TRANSFER caution lights both extinguished. Then both boost pumps were energized at the same time and a pressure of approximately 12 psi was observed and all boost pump and transfer caution lights were extinguished. The acceptable range of boost pump pressure according to the approved 407 Rotorcraft Flight Manual (RFM) is 8-25 psi.

The airframe fuel filter was removed and checked. The fuel filter canister was found to be full of fuel. The fuel was clean and clear with no observed particulate or water. The paper fuel filter was observed to be clean. The fuel filler cap was removed, and the main aft fuel tank was observed to have clear fuel in it with no fuel system discontinuities observed.

2.0 Engine Examination

The NG turbine and NP turbine both demonstrated rotational continuity. The engine exhibited oil in the supply and return lines and a significant level of oil was observed in the engine gearbox. The engine fuel system exhibited fuel from the airframe fuel filter to the engine nozzle. The engine nozzle was in good condition. IR data from the end of the accident flight and 12 seconds prior to the IR being triggered (10 data points) was downloaded and retained. No engine faults were

observed in the data prior to the impact. The trigger fault that commenced the recording of IR data was a torque rate exceedance.

Submitted by:

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