

National Transportation Safety Board

Office of Research and Engineering

Washington, D.C. 20594

Performance Study

Specialist Report

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A. ACCIDENT

Location: Houston, Texas
Date: May 2, 2020
Time: 02:03 central daylight time (CDT)
Airplane: 369E MD Helicopter, N8375F
NTSB Number: CEN20LA167

B. SUMMARY

On May 2, 2020, about 02:03 central daylight time, a model 369E MD Helicopter, N8375F, was destroyed when it was involved in an accident near Houston, Texas. The pilot sustained serious injuries and the other flight crewmember sustained fatal injuries. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 public aircraft flight.

C. PERFORMANCE STUDY

This performance study is based on Automatic Dependent Surveillance-Broadcast (ADS-B) data provided by the Federal Aviation Administration (FAA). ADS-B broadcasts an airplane's Global Positioning System (GPS) position and other data to the ground where it is recorded. The GPS position has an accuracy of approximately 20 meters (65 ft) in both the horizontal and vertical dimensions. However, during this flight, altitude was only recorded to the nearest 100 ft.

Weather Observation

Weather was reported ten minutes before the accident at George Bush Intercontinental Airport (IAH), approximately three nautical miles (NM) northeast of the accident site. The temperature was 68°F (20°C), the dewpoint 60.8°F (16°C), and the barometric setting was 30.03 inHg. Winds were reported as 170° at 4 kts and visibility was 10 statute miles. According to United States Naval Observatory data, the Moon had set and was more than 30° below the horizon, providing no illumination at the time of the accident.

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Accident Flight

Figure 1 shows the helicopter leaving William P. Hobby Airport (HOU) at 01:04. The flight lasted just under an hour during which time the altitude varied between 400 and 700 ft¹ mean sea level (msl) and the groundspeed between 20 and 130 kts (Figure 2).

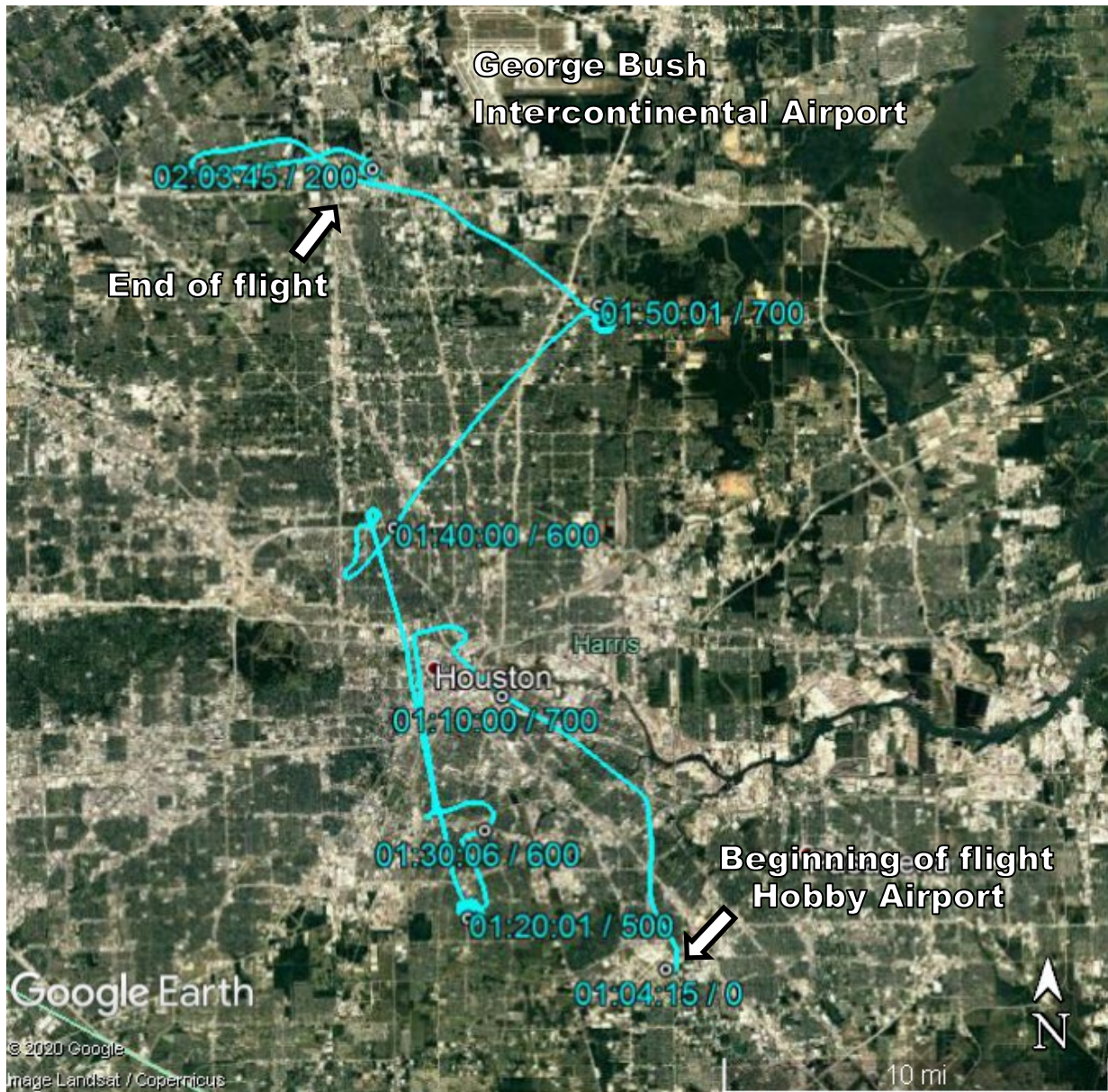


Figure 1. Accident flight in blue with select times and altitudes (msl) annotated in blue.

¹ Terrain elevation in the area varied between 20 and 90 ft above sea level.

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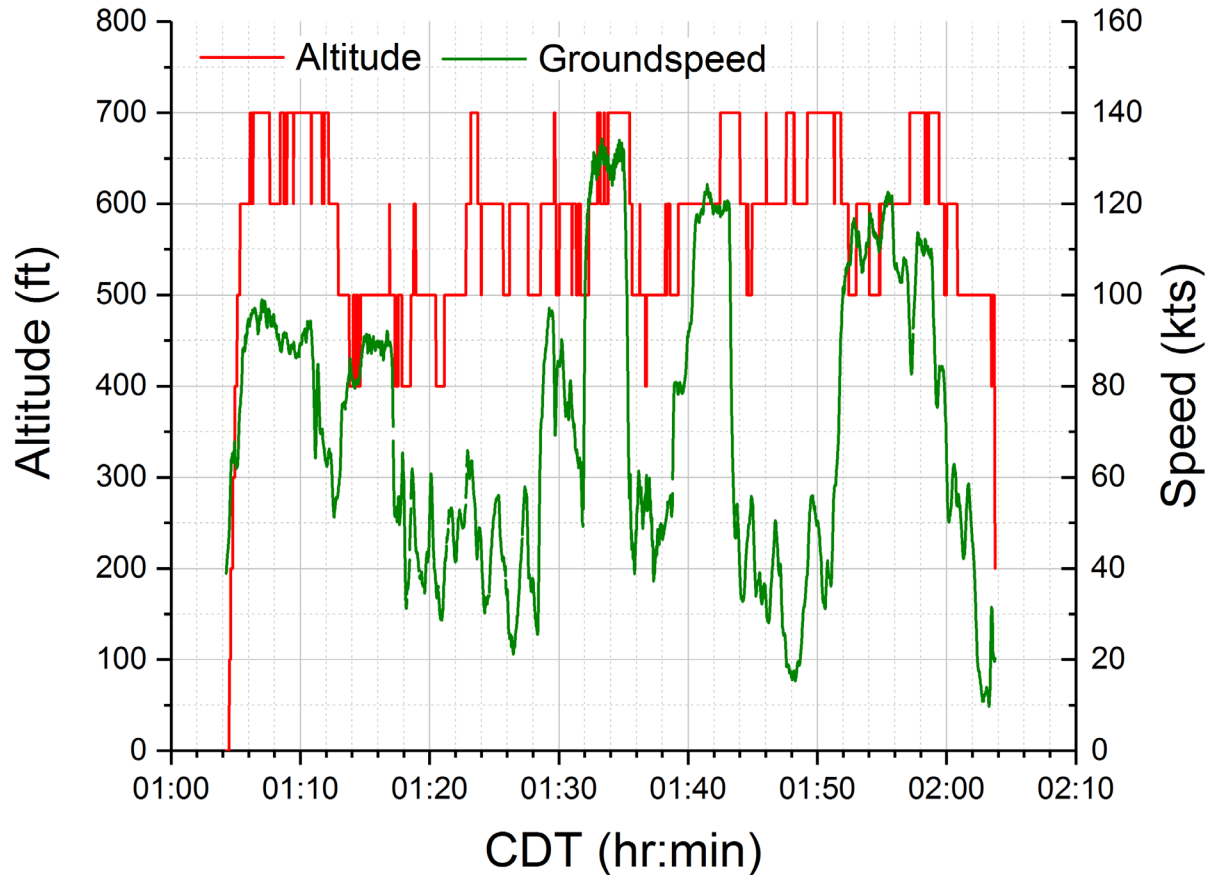


Figure 2. Recorded altitude (msl) and calculated groundspeed.

The helicopter approached the accident location just before 02:00 (Figure 3 and Figure 4). It slowed to a groundspeed between 40 and 60 kts and descended to complete a right-hand circling turn over the area at an altitude of 600 ft. A minute later it began a second right-hand turn, this time at a recorded altitude of 500 ft. At 02:02:20, the helicopter turned onto a south-easterly heading and slowed to near 10 kts.

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Figure 3. End of flight path. First right-hand turn at 600 ft msl indicated by yellow arrow, second right-hand turn at 500 ft msl indicated by orange arrow. The final right-hand turn is shown in pink.

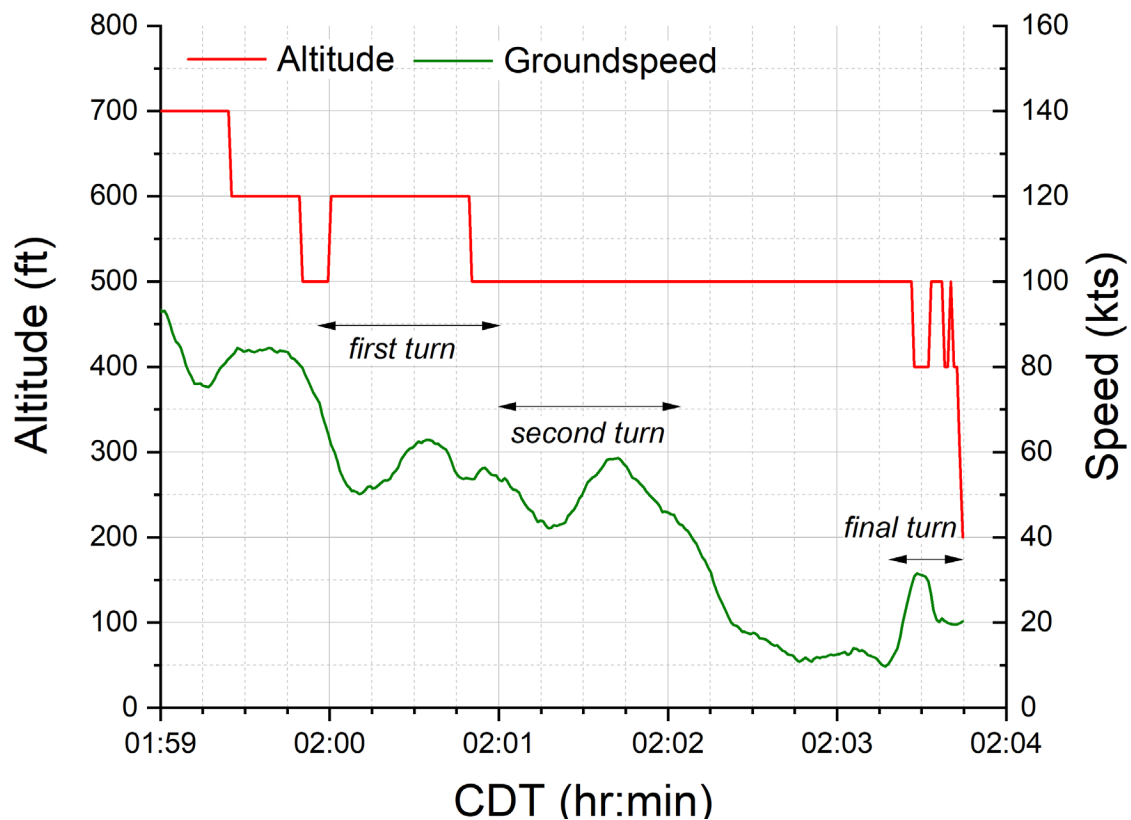


Figure 4. Altitude (msl) and groundspeed for last five minutes of flight.

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At about 2:03:20, the helicopter began a tight right turn and accelerated from 10 kts to 30 kts (Figure 5). The helicopter stayed at 30 kts for about five seconds before slowing to 20 kts. The right turn continued and tightened until about 2:03:39 when it straightened for the final five seconds of flight.

A witness video of the accident helicopter is evaluated in the NTSB Video Study [1]. The helicopter could be seen spinning from 2:03:35 to 2:03:44 (Figure 5), but the beginning of the spin was not recorded in the video. The video study determined the yaw rate was increasing from 146 to 178 deg/s while the helicopter was visible. The helicopter's yaw was to the right, opposite the rotation of the main rotor blades.

In an interview, the pilot stated that he accelerated in an attempt to gain control of the helicopter yaw. If the pilot's statement corresponds with the increase in speed at 2:03:20, the yaw began before 2:03:20 and preceded the final tightening right turn.

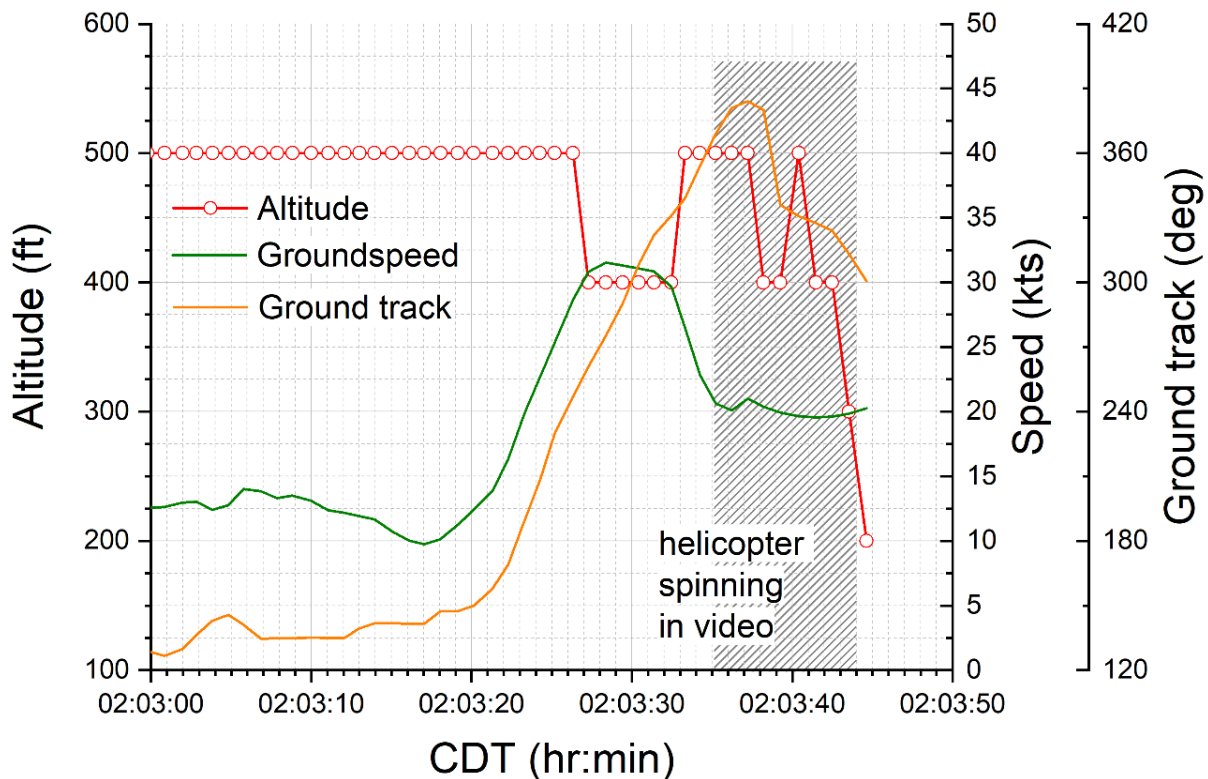


Figure 5. Altitude (msl), groundspeed, and ground track for end of flight.

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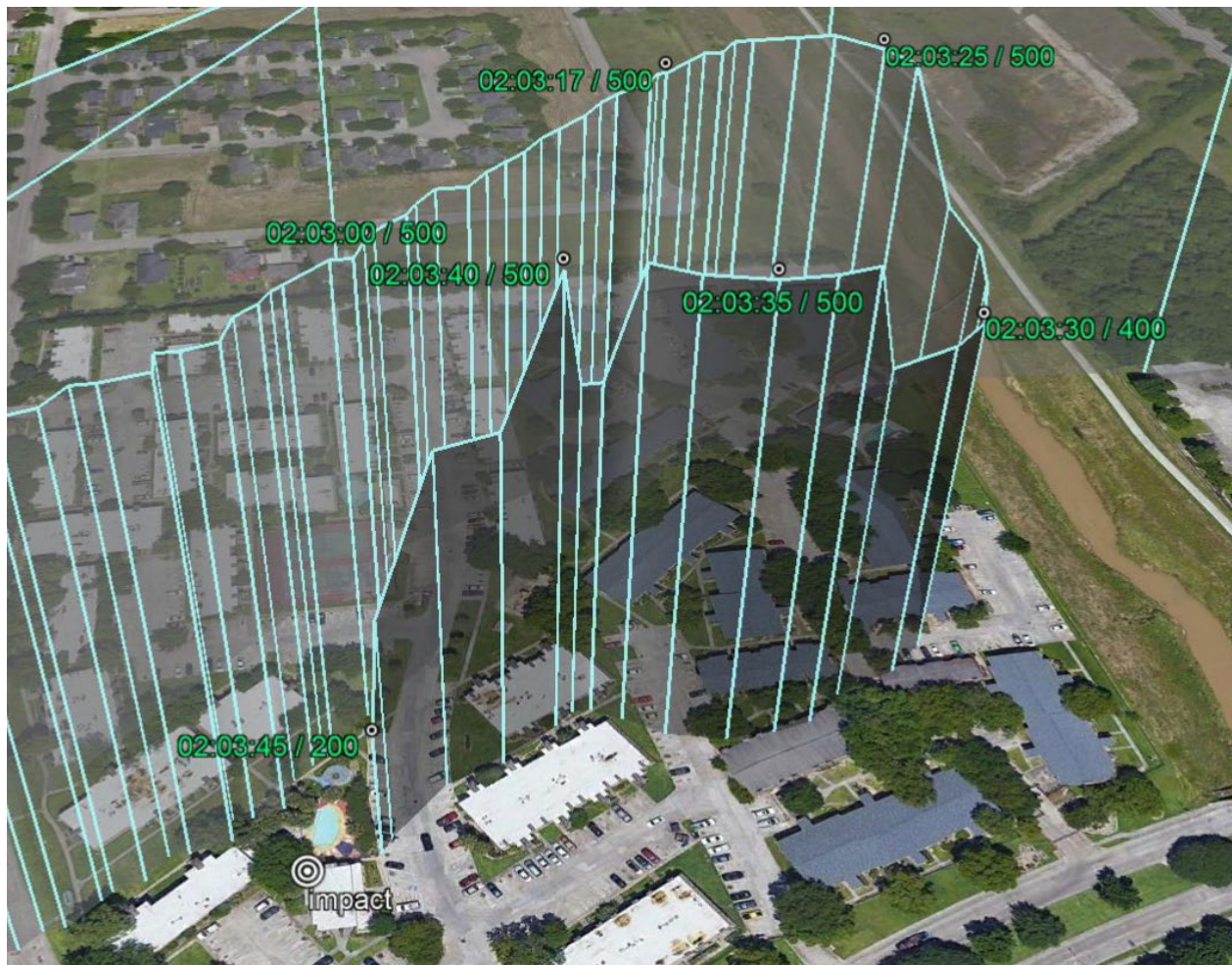


Figure 6. Final turn and descent.

Of interest was the possibility of loss of tail rotor effectiveness (LTE). LTE occurs when airflow through the tail rotor is altered such that there is no longer enough anti-torque thrust to keep the helicopter fuselage from yawing opposite the rotation of the main rotor blades. Helicopters with counterclockwise rotating main rotor blades are at risk of LTE in low-speed flight when winds are from the left or a tailwind. Winds recorded at the time of the accident were 4 kts from 170°. From 2:02:50 until 2:03:20, the helicopter was on a track of about 137°. The resulting wind would have been a right quartering headwind of low magnitude. The recorded winds were not conducive to LTE for this helicopter.

Within the resolution of the recorded altitude, the helicopter's flight path appeared to be level at the suspected onset of spin, making it unlikely that the spin and descent were a result of vortex ring state (also known as settling with power). Additionally, vortex ring state does not usually result in an uncontrolled spin.

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D. CONCLUSIONS

While performing low-speed, right circling turns the helicopter experienced an uncommanded right yaw which developed into a spin. The start of the yaw event is unknown, but likely preceded the final right turn. Loss of tail rotor effectiveness is not consistent with the recorded winds at the time of the accident, and vortex ring state is not consistent with the flight path and the uncontrolled spin.

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E. REFERENCES

1. Video Study, CEN20LA167, National Transportation Safety Board.