

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Washington, D.C. 20594

April 27, 2020

Video Study

NTSB Case Number:
WPR18FA013

A. ACCIDENT

Location: Four Corners, California
Date: October 21, 2017
Time: 1612 PDT
Aircraft: Extra EA 300/L

B. AUTHOR

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NTSB

C. ACCIDENT SUMMARY

On October 21, 2017, at 1612 Pacific daylight time, an EXTRA Flugzeugproduktions - und Vertriebs - GmbH, EA 300/L, N414MT, collided with terrain within the watershed of the El Capitan Reservoir, near Four Corners, California. The flight instructor and passenger sustained fatal injuries and the airplane was destroyed. The airplane was registered to KD Leasing, LLC, and was being operated by California Extreme Adventures, LLC, doing business as Sky Combat Ace (SCA), as a Title 14 *Code of Federal Regulations* (CFR) Part 91 instructional flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight, which departed Gillespie Field Airport (SEE), San Diego/El Cajon, California, at 1557.

D. DETAILS OF INVESTIGATION

The goal of this investigation was extracting information from a video that could help in estimating the cause of this accident. Analysis was based on a video recorded by a GoPro camera installed in the airplane that crashed. The video had 1920x1080 resolution, frame rate of 30 fps, and duration of about 17 minutes. In the discussion below, event timing is reported with reference to the beginning of the video.

Visual Evidence

The passenger was sitting in the front seat of the airplane and the pilot in the rear seat. The camera was mounted inside the airplane, on the front side of the canopy, oriented to the rear, facing the passenger. During the first six and a half minutes of the video, the airplane was executing aerobatic maneuvers. The pilot, seated behind the passenger, was not visible during this time.

At about time 6:08 into the video, the airplane started a right roll maneuver. At about time 6:15, it transitioned into a left roll maneuver. Past 6:22, ground references were no longer visible and the view through the canopy only showed the blue, cloudless sky. Ground references were seen again in the upper left corner of the video frames between 6:26.40 and 6:27.20, indicating that the airplane was still in a left roll maneuver.

The airplane canopy is hinged on the right side of the fuselage and swing-opens to the right. Past time 6:29.10, the video showed a slight gap between the fuselage and the bottom right side of the canopy, where the canopy hinges are. The gap probably opened because of inertial and/or aerodynamic forces. Figure 1 shows the gap at time 6:31.80. On the left side, there was no visible gap between the canopy and the fuselage. At about that time, the passenger's body started moving left and right more than it had before.



Figure 1. Gap between Fuselage and Canopy at Time 6:31.8

At time 6:33.16, the forward (next to the passenger) canopy locking pin is still seen in the Lock position, as shown in Figure 2a. At time 6:33.23, the locking pin is seen closer to the Unlock position, as seen in Figure 2b. At time 6:33.26, the locking pin is in the

Unlock position and the canopy starts opening. At time 6:33.29, the canopy is on its way toward being fully open, as seen in Figure 2d.

At time 6:33.63, the canopy was fully open, having swung almost 180° to the right. Because of the motion of the passenger to the left after the canopy started opening, the pilot could be seen between 6:33.33 and 6:33.63. In three video frames between video times 6:33.46 and 6:33.53, the pilot's left hand is seen on the aft canopy locking pin handle, possibly indicating that the pilot opened the canopy intentionally. Note that the aft and forward canopy locking pins are interconnected. Since the camera was attached to the opened canopy, past 6:33.63, the video no longer showed the passenger, the pilot, or the interior of the cockpit.



(a) Video Time: 6:33.16



(b) Video Time: 6:33.23



(c) Video Time: 6:33.26



(d) Video Time: 6:33.29

Figure 2. Positions of Forward Canopy Locking Pin



Figure 3. Video Frame Showing Fire at the Crash Location (Time: 6:39.32)



Figure 4. Video Frame Showing Smoke at the Crash Location (Time: 6:54.39)

Past video time 6:33.63, the camera was spinning while it was falling toward the ground, as is evident in the ground images that the camera recorded. At video time 6:39.32, the camera recorded a video frame shown in Figure 3. It shows fire at the location where the airplane impacted the ground. The shape of the fire in the figure is due to the high speed of the falling camera. Figure 4 shows the crash location at video time 6:54.39. Both fire and smoke are visible in the video frame.

The camera impacted the ground at time 6:59.65, about 26 seconds after the canopy opened. It is not possible to determine based on the visual information in the video if the camera was attached to the canopy during these 26 seconds.

Propeller Sound Analysis

The video included a sound channel that was sampled at 48kHz. Sound spectrum analysis was performed on 0.5-seconds-long samples using a fast Fourier transform (FFT). Figure 5 shows the magnitude of the FFT transform of the sound between time 6:32.50 and time 6:33.00, i.e., just before the canopy started opening. The rated speed of the Lycoming AEIO-580-B1A engine is 2700 RPM. The airplane propeller had three blades. Therefore, the blade passage frequency of 2700×3 cycles per minute and its second harmonic, at 2700×6 cycles per minute, are marked in the figure.

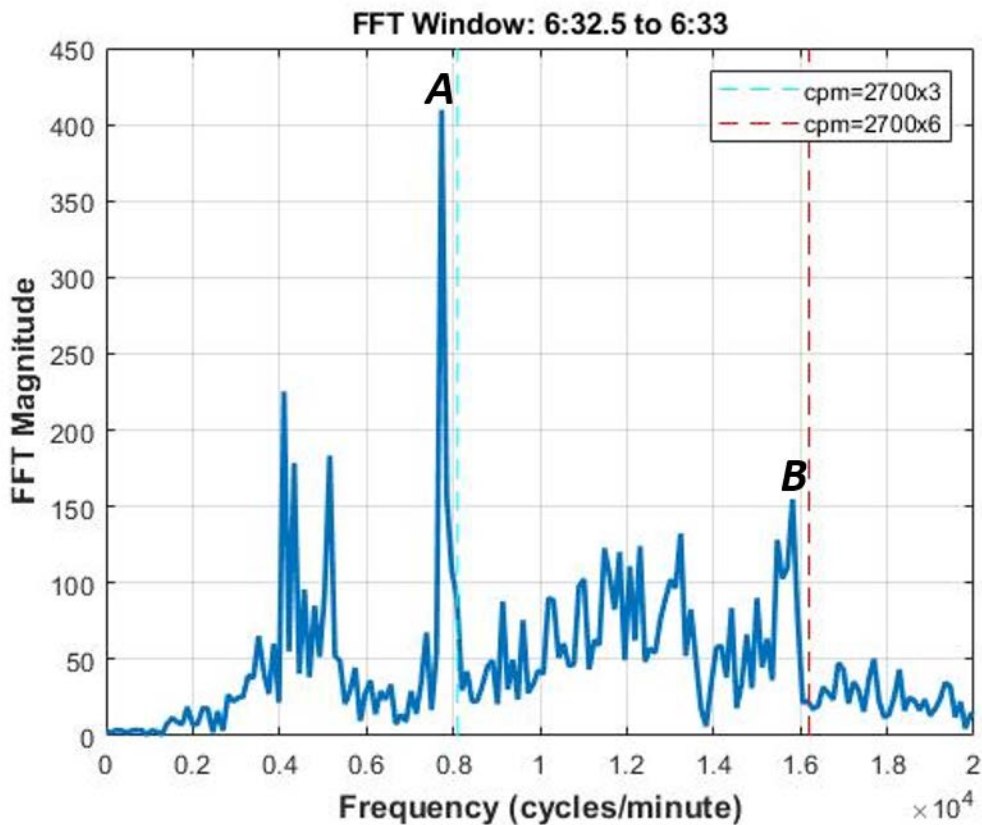


Figure 5. Sound Spectrum before the Canopy Opened

Spectral peak *A*, just to the left of the 2700×3 line, indicates that the engine speed was about 2580 RPM, slightly below the rated speed. Spectral peak *B*, just to the left of the 2700×6 line, is the second harmonic of the blade passage frequency and/or sound emitted by the 6-cylinder engine.

The sound recorded in the video during the 26 seconds after the camera separated from the airplane was dominated by a large spectral peak at 36.1 Hz (2166 cycles per minute) and its second harmonic at 72.2 Hz (4332 cycles per minute). This sound was not generated by the airplane that impacted the ground 20 seconds before the camera impacted ground.

E. CONCLUSIONS

A video recorded by a camera installed in an airplane that crashed was used to document events prior to the crash. The video showed the airplane canopy opening in flight. The camera separated from the airplane after the canopy opened but continued recording. The video showed the airplane impacted the ground about six seconds after the canopy opened. The camera impacted the ground about 26 seconds after the canopy opened.