

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

May 4, 2020

Onboard Image Recorder

Specialist's Factual Report
By Gerald Kawamoto

1. EVENT

Location: Four Corners, California
Date: October 21, 2017
Aircraft: Extra Flugzeugproduktions-Und EA 300/L, N414MT
Operator: California Extreme Adventures LLC
NTSB Number: WPR18FA013

2. GROUP

On January 23, 2020 and January 24, 2020 a video group was convened at the National Transportation Safety Board (NTSB) Vehicle Recorder Laboratory.

Chairman:	Gerald Kawamoto Electrical Engineer NTSB
Member:	Sean Payne Mechanical Engineer NTSB
Member:	Elliot Simpson Investigator-In-Charge (IIC) NTSB
Member:	Van McKenny Aerospace Engineer NTSB
Member:	Dan Horak Vehicle Performance Specialist NTSB
Member:	Douglas Vayda Chief Pilot for Extra USA Southeast Aero Services Inc.

3. SUMMARY

On October 21, 2017, at 1612 Pacific daylight time, an Extra Flugzeugproduktions-Und 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 operated by California Extreme Adventures, LLC, doing business as Sky Combat Ace (SCA), under the provisions of 14 *Code of Federal Regulations (CFR)* Part 91. The local instructional flight departed Gillespie Field Airport (SEE), San Diego/El Cajon, California, at 1557. Visual meteorological conditions prevailed, and no flight plan had been filed.

4. DETAILS OF INVESTIGATION

On November 18, 2019, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following Onboard Image Recorder:

Recorder Manufacturer/Model:	GoPro Hero (2014)
Recorder Serial Number:	C3111025802857

4.1. Recorder Description

The GoPro is a compact, lightweight, point-of-view digital camera enclosed in a ruggedized housing that allows the camera to be mounted in a variety of positions using an array of supported accessories. The camera supports various recording resolutions and frame rates set by the user. The camera can be set to record still images simultaneously or independently of the video stream. The camera supports recording to micro SD¹ cards.

4.2. Recorder Damage

The device was in good condition upon arrival at the Vehicle Recorder Laboratory. The 16 GB micro SD card was removed and the data files were downloaded normally.

4.3. Video Files

The micro SD card included a total of eight video files pertaining to the accident flight. The files originated from one recording and were split into multiple files due to the recording logic of the GoPro. File names were consistent with GoPro naming logic for split files. The first file contained the start of the flight, the second file contained the accident event, and the remaining six files showed the perspective of the camera at rest on the ground. The first seven files were 17 minutes and 35 seconds in duration, and the last file was 16 minutes and 8 seconds in duration. All recordings were made at a resolution of 1920 x 1080 pixels at a frame rate of 29.97 frames per second (fps).

4.4. Timing and Correlation

The internal time of the GoPro is updated when the device is connected to GoPro software via USB interface to a computer. Each video began at 00:00:00 (HH:MM:SS),

¹ Secure Digital – a standardized format for removable memory devices.

where HH is elapsed hours, MM is elapsed minutes, and SS is elapsed seconds from the start of the segment. Metadata extracted from the first video file showed the creation time and date was 16:35:18 on October 21, 2017. The correlation of the device time to a standard time could not be confirmed. The times included in the summary below have been offset from elapsed time to recorded device time.

4.5. Summary of Recording Contents

In agreement with the Investigator-in-Charge, a video group convened and developed this summary report.

The GoPro was mounted in the accident aircraft on the front of the canopy. The camera was on the centerline of the aircraft facing backward. The view showed the passenger's face and upper part of the torso. The upper left and right quadrants provided an aft facing view outside of the aircraft.

4.5.1. Video Segment One (16:35:18)

The recording started at 16:35:18. The aircraft was on the ground with the canopy open and the passenger appeared to already be seated in the cockpit. The pilot was observed securing himself. The engine start and run-up and taxi were unremarkable. The aircraft departed about 16:44:41. The climb out and transition to the acro area were uneventful.

4.5.2. Video Segment Two (16:35:18 + 00:17:35)



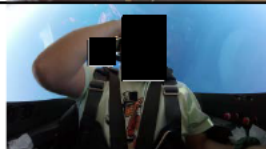
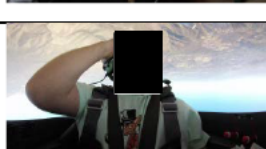

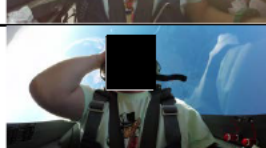





The second video segment started at 16:52:53. The pilot and passenger alternately performed roll, slow roll, vertical roll, hammerhead, tailslide, and subsequent recoveries, ending in what appeared to be a tumble maneuver. After that maneuver, the pilot could be heard saying, "How's that", and the passenger responded, "That was awesome." At various points throughout the maneuvers, the passenger appeared to be looking outside of the cockpit in a manner consistent with scanning for traffic. The passenger made "whooping" sounds throughout the final maneuver. All maneuvers appeared to be initiated at similar altitudes.








The following section describes the accident sequence:

At 16:58:53 the aircraft was in level flight. By 16:59:01 the pitch had increased to approximately 45 degrees nose up with wings leveled (45 degrees nose up on the longitudinal axis).




By 16:59:05 the aircraft had transitioned into a 90 degree right roll. The aircraft continued to roll past 90 degrees and the nose pitched down and the direction of the roll reversed. The aircraft then transitioned into an inverted spin. The nose then dropped as the spin progressed. After about one revolution, the right wing dropped and the direction of rotation reversed. During entry into the reversal, the rate of rotation rapidly increased.

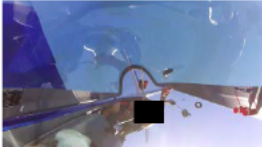



The following summary was documented second by second from 16:59:10 to 16:59:26. Still frame images are included to provide frame of reference. Identifiable features have been redacted. References to the chin strap describe the loose flap of the left chin strap to side of the passenger's head. Descriptions provide detail on the sequence of events of the preceding 30 frames (1 second).

16:59:10	The aircraft was inverted and level in pitch with the left wing 30 degrees down. The terrain was visible in the upper left quadrant and filled the upper right quadrant. The passenger reached to secure his headset and the position of the microphone had shifted in position to above his right eye. The passenger's left hand was rested against the left side of the fuselage.	
16:59:11	The aircraft appeared to be level with the right wing down. The sun was visible in the right quadrant and the terrain was visible in the entire left half of the frame. The microphone had moved below the passenger's right eye. The left chinstrap was positioned by the passenger's left ear.	
16:59:12	The nose of the aircraft appeared to pitch down. A segment of terrain was visible in the upper left corner of the frame and the sky was visible in the remaining portion of the frame. The passenger continued to hold his headset with his right hand. The reflection of the pilot was visible in the canopy and the pilot's hat, glasses, and earpiece appeared to be in their original positions.	
16:59:13	The aircraft was flat, inverted with wings level with the horizon. Terrain filled the top third of the frame.	
16:59:14	The tail was slightly above the horizon. The terrain was visible in the upper left quadrant of the frame and the sky was visible in the upper right quadrant of the frame.	
16:59:15	A segment of the terrain was visible in the upper left corner of the frame and the sun was positioned in the left third of the frame. The passenger's left chinstrap was parallel to his mouth.	
16:59:16	The sky was visible across the entire frame. The passenger was looking forward. His right hand remained on his headset and the chinstrap remained parallel with his mouth.	
16:59:17	The sky was visible in the top half of the frame. The glare of the sun became visible in the right side of the frame. The passenger's arm moved to the left side of his headset and the left chinstrap remained parallel with his mouth.	
16:59:18	The sky was visible in the top half of the frame. The glare of the sun was visible in the right side of the frame. The passenger's arm remained on the left side of his headset and the left chinstrap remained parallel with his mouth.	
16:59:19	The sky was visible in the top half of the frame. The glare of the sun remained visible in the right side of the frame. The passenger's arm moved to the right side of his face.	
16:59:20	The terrain was visible in the top left corner of the frame and the sun moved out of the frame. The passenger's left chinstrap moved to a position above his mouth.	

16:59:21	The sun was visible on the left side of the frame. The sky was visible in the remaining portion of the frame. The passenger's chinstrap moved back to a position parallel his mouth. The pilot's right shoulder and parachute were visible in the top left of the frame in the reflection of the canopy.	
16:59:22	The sky was visible throughout the top half of the frame. The position of the passenger appeared to have moved approximately 2 inches lower in his seat.	
16:59:23	The passenger had oscillated from left to right. The sun glare was visible on the left side of the frame.	
16:59:24	The passenger continued to oscillate from left to right. The sun glare was visible on the left side of the frame.	
(16:59:24.9)	(gap observed in right canopy frame)	
16:59:25	The left aft canopy release handle moved forward about a quarter of an inch. The sun glare was visible at the top of the frame. The passenger's right arm moved from the right side of his head towards the camera. A gap briefly appeared in the right canopy frame.	
16:59:26	The passenger continued to oscillate two more times from left to right in a more pronounced manner. The passenger briefly looked down and his right hand moved down to his lap. The sun glare was visible in the upper right quadrant of the frame.	

The following summary was documented frame by frame from 16:59:26.33 to 16:59:26.7.

16:59:26.33 to 16:59:26.5	The position of the aft canopy release handle had moved forward and a gap on the left side of the canopy became visible. The aft latch moved forward and the canopy opened from the left side.	
16:59:26.53	The pilot became visible and his left hand was on the latch of the canopy. The passenger's headset departed from his head. The pilot's hat started departing from his head.	
16:59:26.57	The pilot's left hand was seen covering the canopy release handles. His arm was raised above and forward of his head. The pilot's hat departed from his head. The passenger's headset continued to fly backwards toward the pilot. The sun was visible in the lower right corner of the frame. The canopy was halfway open with the left side of the canopy frame over the centerline of the fuselage. An upward deflection of the right aileron was observed. There was no visible deflection of the elevator. There was a slight right deflection of the rudder.	

16:59:26.6	The canopy was perpendicular to the fuselage. The pilot's hand was on the canopy release, his fingers started to extend from the release handle of the canopy. The canopy strap was in full extension indicating that the canopy had reached its maximum extension. The passenger's headset continued to break apart. An upward deflection of the right aileron was observed.	
16:59:26.63	The canopy strap had released and the canopy release handle appeared to have moved back to the locked position. The sun was visible in the bottom center of the frame. An upward deflection of the right aileron was observed.	
16:59:26.67	The headset cord of the passenger's right earphone and microphone were trailing and still connected to the front of the cockpit. The pilot's left forearm was positioned over the top of his head. The canopy was slightly past the full open position and the retention strap had separated from the canopy. An upward deflection of the right aileron was observed. A slight right rudder deflection could be observed.	
16:59:26.7	The cord of the passenger's right earphone and microphone were observed trailing and still connected to the front of the cockpit. The pilot's left forearm remained positioned over the top of his head. The canopy had rotated 180 degrees from its closed position. An upward deflection of the right aileron was observed. A slight right rudder deflection could be observed.	

The camera descended for approximately 26 seconds and came to rest on the ground at 16:59:53.

4.5.3. Video segments 3 through 8

The third through eighth video files showed the perspective of the camera at rest on the ground until the recording ended at 18:54:31.