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

May 12, 2020

# Video Study

**NTSB Case Number:**
**WPR19MA177**

## A. ACCIDENT

| | |
|---|---|
| Location: | Dillingham Airfield, Mokuleia, Hawaii |
| Date: | June 21, 2019 |
| Time: | 1822 Hawaii-Aleutian Standard Time (HST) |
| Aircraft: | Beech 65-A90 |

## B. AUTHOR

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NTSB

## C. ACCIDENT SUMMARY

On June 21, 2019, at 1822 Hawaii-Aleutian Standard Time, a Beech 65-A90, N256TA, collided with terrain after takeoff from Dillingham Airfield (HDH), Mokuleia, Hawaii. The commercial pilot and ten passengers sustained fatal injuries and the airplane was destroyed. The airplane was owned by N80896 LLC and was being operated by Oahu Parachute Center (OPC) under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a local sky-diving flight. Visual meteorological conditions prevailed, and no flight plan had been filed.

## D. DETAILS OF INVESTIGATION

This investigation analyzed a video that was recorded on the accident day by a passenger in the accident airplane during its last flight before the accident flight. The flight was piloted by the accident flight pilot and the goal of this investigation was to examine the pilot's takeoff routine.

Analysis of Visual Information in the Video

The video had 1920x1080 resolution and frame rate of 30 fps. The video showed mostly the interior of the airplane. Ground references were visible through a window for only about 3.5 seconds. The only identifiable details on the ground were two trees and the ocean. The two trees or a part of one of the trees were visible for only 2.1 seconds. Figure 1 is a frame from the video that shows the two trees that were visible through the airplane window. They are marked by the yellow circle. During the period when the two trees were visible, the airplane had already taken off from Runway 8 and appeared to be in a nose-up attitude, transitioning to a left turn out toward the ocean. Due to the movement of the camera within the cabin, an accurate assessment of bank and pitch angles could not be determined.

**Figure 1. Video Frame Showing Two Trees Visible through an Airplane Window**

There are many trees located along Farrington Highway that runs parallel to the runway, north of it. The details seen in video frames such as the one in Figure 1 were insufficient for determining which two trees were visible in the video. Therefore, YouTube videos were used to examine trees along Farrington Highway and identify the two trees visible in the video.

Figure 2 is a frame from a YouTube video recorded from inside a glider that was flying above Runway 8. The two trees are marked by the yellow circle. Figure 3 is a frame from a YouTube video recorded from inside an airplane that was flying above the runway. The two trees are marked by the yellow circle. Figure 4 is a frame from a YouTube video recorded from a car driving west on Farrington Highway. The two trees are marked by the yellow circle.

**Figure 2. Frame from a Video Recorded with a Camera Installed inside a Glider**

Comparison of the images of the two trees visible in Figure 1 with the two trees marked in Figures 2, 3 and 4 led to the conclusion that they were the same trees. The location of these two trees happens to be near the location where the accident airplane crashed. Figure 1 indicated that the airplane during its last flight before the accident flight started turning toward the ocean as it passed the two trees along the runway.

Analysis of Sound Information in the Video

The video recorded sound at the rate of 44100 samples/second. Magnitude of the Fast Fourier Transform (FFT) spectrum of the sound signal is shown in Figure 5. The peak is at 6405 cycles/minute, indicating that the speed of the engines driving the 3-bladed propellers was 6405/3=2135 rpm. The FFT algorithm frequency bin was 54 rpm wide. The rotational speed of 2135 rpm is within the normal propeller shaft speed range

of the PT6A engines, 1800 rpm to 2200 rpm. The narrow spectral peak in Figure 5 indicates that the two engines were operating at the same constant speed.

**Figure 3. Frame from a Video Recorded with a Camera inside an Airplane**

**Figure 4. Frame from a Video Recorded with a Camera Installed in a Car**

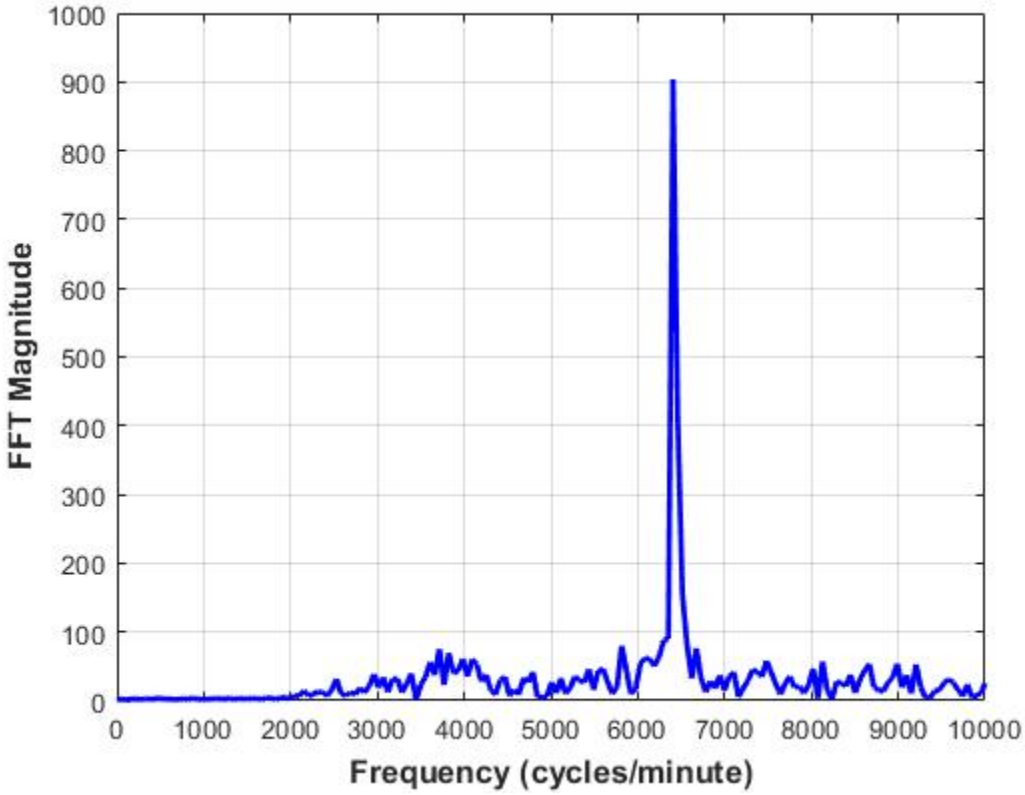


**Figure 5. Spectrum of the Sound Channel in the Analyzed Video**

Analysis of GPS Information in the Video

The Exif metadata in the video included the GPS location and information of the iPhone X camera when the video started. The latitude and longitude data are considered accurate because the specified location is near the centerline of the runway. Figure 6 shows that location. It is assumed that the camera owner did not manipulate the video and the GPS metadata indeed corresponds to the camera location when the analyzed video started.

The two trees mentioned above exited the field of view of the camera at video time 8.6 seconds as the airplane advanced along the runway. Assuming an airplane ground speed of 100 knots, after 8.6 seconds the airplane would have advanced 1452 feet. Its location on the runway at 8.6 seconds into the video would have been as marked on Figure 6. This location relative to the two trees marked in the figure agrees well with the location estimated above based on the visibility of the two trees in the video.

The crash location marked in Figure 6 is where the airplane crashed during an attempted takeoff after the flight that is analyzed in this report. Figure 7 is a photograph taken during the investigation of the crash. It shows the crash location and the two trees mentioned above.

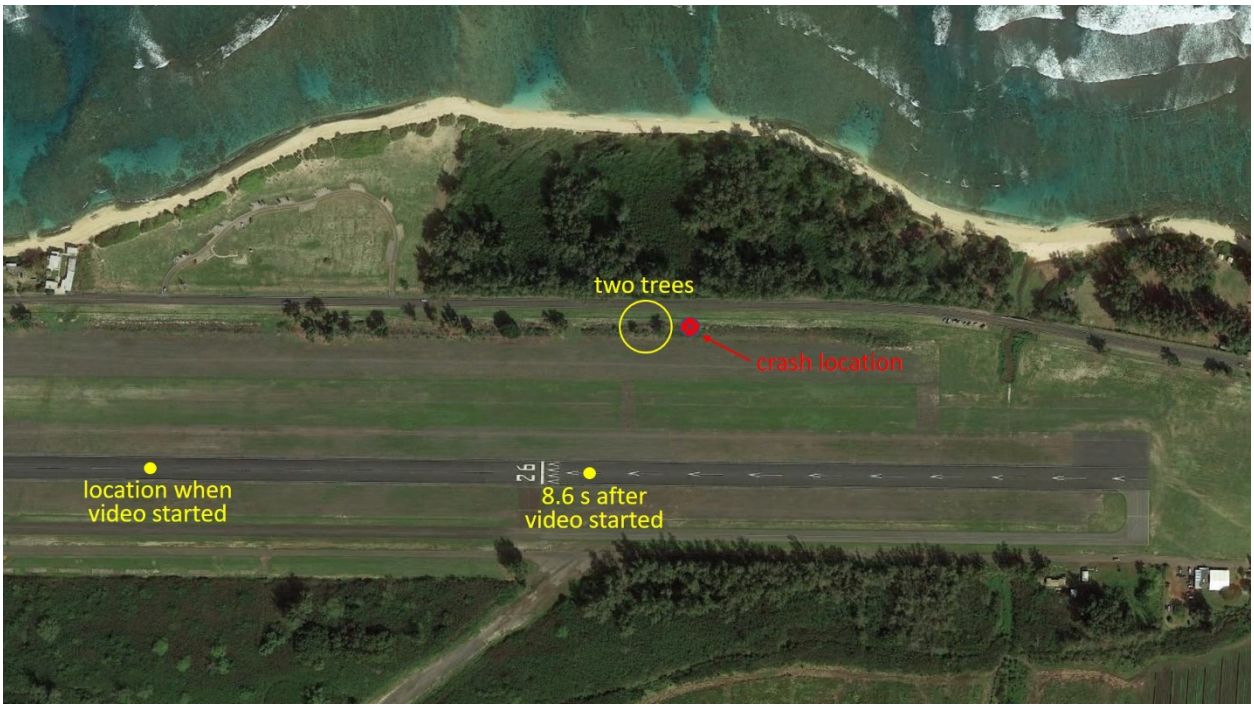


**Figure 6. GPS-Based Airplane Locations on the Runway**


**Figure 7. Photograph Showing the Crash Location and the Two Trees**

The video metadata data also included the GPS altitude. It was 29 m (95 feet). GPS altitude accuracy is known to be significantly lower than GPS latitude-longitude accuracy. To determine if the GPS altitude data can be trusted, GPS altitudes recorded by another iPhone at the Dillingham airport after the accident were inspected. The three GPS altitude measurements, taken at the same location and at nearly the same time, were 9.7 m, 12.5 m and 43.1 m. Therefore, considering these large differences between measurements of the same altitude, it was concluded that the 29 m GPS altitude in the video metadata should not be considered a reliable altitude measurement of the airplane.

## E. CONCLUSIONS

A video that was recorded on the accident day by a passenger in the accident airplane during its last flight before the accident flight was analyzed. The video included visual, sound and GPS information. The analysis estimated the location of the airplane at a time when ground references were visible in the video. GPS data confirmed that location. Sound spectrum analysis indicated that the airplane engines operated normally during the last flight before the accident flight.