

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

March 6, 2017

Video Study

NTSB Case Number:
WPR16FA152

A. ACCIDENT

Location: Columbia, California
Date: July 27, 2016
Time: 4:45 PDT
Aircraft: Cessna 310B

B. AUTHOR

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NTSB

C. ACCIDENT SUMMARY

On July 27, 2016, about 1645 Pacific Daylight Time, a twin-engine Cessna 310B airplane, N6605B, sustained substantial damage following a loss of control during takeoff at the Columbia Airport (O22), Columbia, California. The pilot and three passengers sustained fatal injuries. The airplane was being operated by the pilot as a personal cross-country flight under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no FAA flight plan was filed.

Witnesses stated that they saw the airplane taxi onto runway 17 for departure. During the initial climb, about 40 feet above ground level, the airplane stopped climbing and started drifting to the left. The witnesses said that the airplane then descended and impacted off the left side of the runway near the general aviation ramp and immediately burst into flames. The initial point of impact was located at the southwest corner of the airport parking ramp, just off the paved surface. From the initial point of impact, the airplane traveled on a 172 degree magnetic bearing about 250 feet before coming to rest at the north edge of the helicopter parking area. All major components of the airplane were located in the debris path. A majority of the airplane fuselage was consumed by the post-impact fire.

D. DETAILS OF INVESTIGATION

Two cameras mounted on an airport building recorded the accident airplane for short periods of time. East Camera (Ch. 3) recorded the last 2 seconds before the airplane impacted ground. Prior to this time window, the airplane was out of the field of view of the camera. Hangar Camera (Ch. 2) recorded the last 5 seconds.

Both cameras had resolution of 704x480 and frame rate of 15 fps. They were motion activated. If there was no significant difference between adjacent frames, the more recent frame was not saved. Motion activation did not affect the Hangar Camera information because the video started only 10 seconds before the airplane entered the camera field of view and all the frames from that time to the time of ground impact, about 5 seconds later, were recorded. The video then continued and recorded ground vehicle traffic that followed the crash.

Motion activation did affect the East Camera. Its video started 11 minutes before ground impact, but it was not activated for a 7 minute period that ended 13 seconds before the airplane entered the field of view. Consequently, East Camera provided relevant information only on the last $13+2=15$ seconds prior to ground impact. The video then continued and recorded ground vehicle traffic that followed the crash.

Camera motion activation depends on a threshold against which the difference between frames is compared. It is possible that during the long time period when the East Camera was not activated there was ground vehicle traffic far from the camera but it generated video frame differences too small to trigger activation.

Figure 1 shows a frame from the East Camera video. The camera used a wide angle lens that caused the barrel distortion seen in the figure. The distortion did not affect the speed analysis described below. The image of the airplane shortly after it entered the field of view is marked in the figure. Also marked are B1 and B2, corners of a building that is visible in the video and in Google Earth images.

Figure 2 shows a frame from the Hangar Camera video. The frame shows the two building corners, B1 and B2, that are also seen in Figure 1. Also seen are three light poles at locations marked by P1, P2 and P3. These light poles are visible in Google Earth images.

Figure 3 is an aerial image from Google Earth that shows the locations of B1, B2, P1, P2 and P3. Also shown in the figure are the locations of the two cameras, East Camera (Ch. 3) and Hangar Camera (Ch. 2), the point of first ground impact, and the location of the main wreckage.



Figure 1. Frame from East Camera Video



Figure 2. Frame from Hangar Camera Video

Lines of sight from the Hangar Camera to locations B1, B2, P1, P2 and P3 are shown in red. If the airplane takeoff was successful, it would have followed runway points R1, R2 and R3. However, based on the location of the initial impact, it deviated east of the runway. Curve T1-T2-T3-T4-T5 is an estimated hypothetical ground track of the accident airplane. It is not based on the videos because they do not provide any information on distances along the lines of sight from the cameras to the airplane. The estimated shape of the ground track is based on assuming that the airplane was initially moving aligned with the runway and then it deviated to east to reach the initial impact location shown in Figure 3.

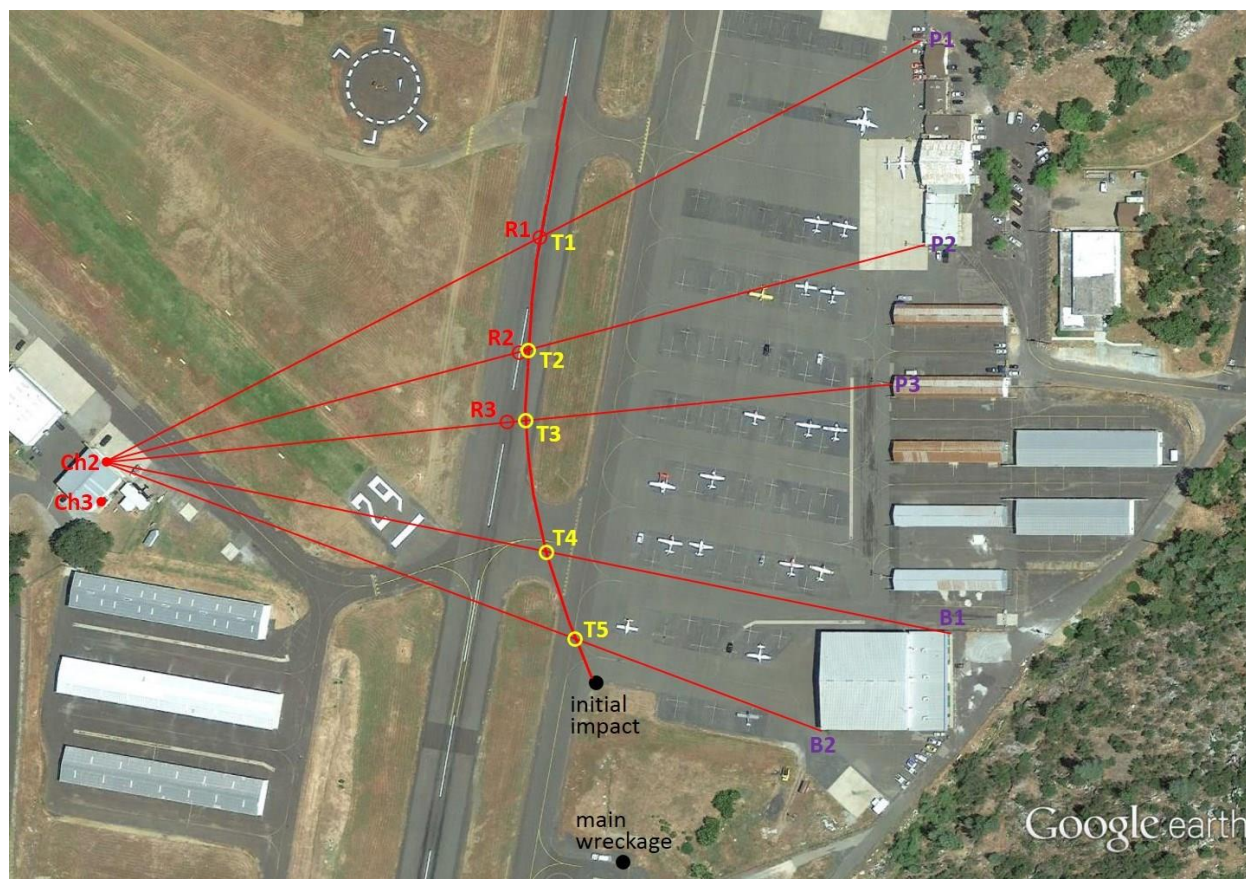


Figure 3. Aerial Image of Accident Site

Speed Estimation

Ground speed of the airplane was estimated based on times derived from the videos and the ground track geometry shown in Figure 3. The times when the airplane was at locations T1-T5 shown in Figure 3 were estimated based on the video frame times when the airplane nose was at locations P1, P2, P3, B1 and B2 in Figures 1 and 2. The distances from location T1 to locations T2-T5 along the assumed trajectory were estimated based on the aerial image in Figure 3. Table 1 lists the times and the distances flown when the airplane was at trajectory locations T1-T5.

Table 1. Times and Distances along Airplane Ground Track

Trajectory Location	Time (seconds)	Distance from T1 (ft)
T1	0.00	0.00
T2	1.40	170.8
T3	2.33	273.9
T4	4.13	474.2
T5	4.93	606.7

Figure 4 shows a plot of the data in Table 1. It also shows a constant speed fit to the data. The nominal constant ground speed estimate, the slope of the fitted line, is 71 knots. Because of possible inaccuracies due to low resolution of the videos and due to the estimated ground track, the estimated ground speed is specified as 71 ± 3 knots.

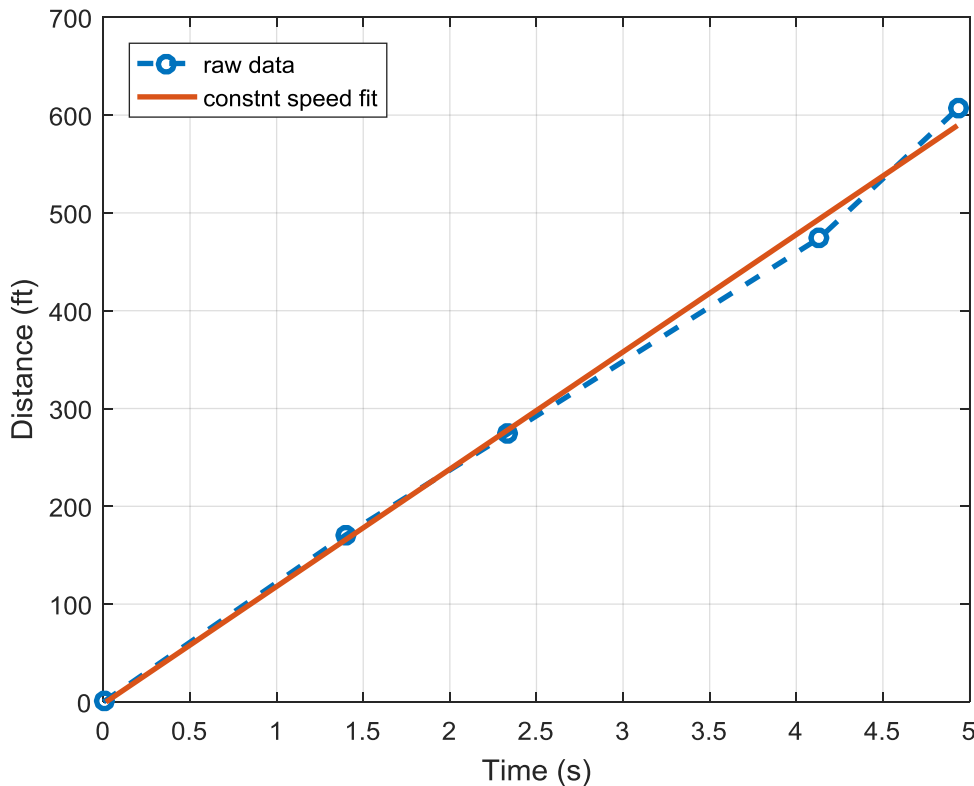


Figure 4. Distance vs. Time along Airplane Ground Track

Vehicle Seen in Videos Shortly after Ground Impact

Both cameras recorded a ground vehicle that moved north along the taxiway east of the runway shortly after the airplane impacted ground. The vehicle entered the field of view of the Hangar Camera from south approximately 19.5 seconds after ground impact and passed by the location of the main wreckage (see Figure 3) approximately 20 seconds after ground impact. It was traveling at 55 mph.

There is no information in the two videos on when and from where the vehicle entered the taxiway south of the main wreckage location. The Hangar Camera video showed only the last 15 seconds prior to ground impact and the East Camera was continuously motion activated only during the last 15 seconds prior to ground impact. Prior to that 15 second period, the East Camera recorded for 11 minutes during which it was mostly not activated. The motion-activated portion of the 11 minute period does not show any vehicles moving to the area south of the main wreckage location.

E. CONCLUSIONS

Videos acquired by two cameras mounted on an airport building were used for estimating the speed of an airplane that crashed while taking off. The estimated ground speed during the last five seconds of flight was 71 ± 3 knots.

The videos show a ground vehicle moving north along a taxiway past the location of the main wreckage. It traveled at 55 mph and was near the location of the main wreckage approximately 20 seconds after the airplane impacted ground. The videos provide no information on that vehicle before that time.