

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

December 19, 2019

Onboard Image Recorder

Specialist's Factual Report
By Sean Payne

1. EVENT

Location:	Berlin, Maryland
Date:	June 29, 2018
Aircraft:	Beechcraft 35, N9745Y
Operator:	Private
NTSB Number:	ERA18LA181

2. GROUP

A group was not convened.

3. SUMMARY

On June 29, 2018, about 0915 eastern daylight time, a Beechcraft 35, N9745Y, was substantially damaged during a forced landing shortly after takeoff from Ocean City Municipal Airport (OXB), Berlin, Maryland. The private pilot was seriously injured, and the passenger sustained minor injuries. A flight plan was filed for the personal flight that was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed at the time of the accident. The flight was destined for a fuel stop in Dublin, Virginia, then continuing to Tullahoma, Tennessee.

4. DETAILS OF INVESTIGATION

On August 27, 2018, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following image recorder:

Recorder Manufacturer/Model:	Garmin VIRB XE
Recorder Serial Number:	469014108

4.1. Recorder Description

The Garmin VIRB XE is a portable Point of View (POV) action camera enclosed in a waterproof case. The camera is capable of recording video at a resolution of up to 1920 x 1080 pixels at 60 frames per second (fps). The camera contains a built

in GPS and can record GPS information as well as accelerometer data and other parameters.

4.2. Recorder Damage

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the Garmin VIRB had not sustained any heat or structural damage and the video and audio information was extracted from the memory card normally, without difficulty

4.3. Electronic Files

The device's memory card contained a number of video recordings and other electronic data files. The last two video recordings were associated with the accident flight and were reviewed for this report.

Video Files

The videos were 1920 x 1080 pixels in resolution with a 29.97 fps frame rate. The Garmin VIRB was fitted with an external audio cable which recorded conversation from the pilot and passenger's headsets as wired through the aircraft's audio panel.

The image recording contained an over the shoulder view of the aircraft occupants and the instrument panel. The camera was mounted behind the pilot and passenger. A view of instrument panel was captured as well as a view out of the forward windscreen. Most instruments were visible, however, throttle, mixture and propeller control as well the gear and flap controls were not visible.

Other Files

The memory card associated with the device also contained a number of .FIT files. An .FIT file is a GIS data file used by some Garmin GPS systems. The files can contain GPS records as well as a variety of other information depending on the configuration of the recording device and other linked devices. The file associated with the crash was named "2018-06-29-08-10-51.fit." This file contained GPS information that matched the accident flight. No other .FIT files were reviewed.

4.4. Timing and Correlation

Timing of the transcript is expressed as Universal Coordinated Time (UTC). The timing of the video events was compared to an GPS record which was recorded by the camera system. The time of the start of the recording was 13:10:29 UTC. The following time formula was used to convert events from the video recording to UTC:

$$\text{Garmin VIRB Elapsed Time} + 47,429 \text{ Seconds} = \text{UTC}$$

4.5. Summary of Recording Contents

In agreement with the Investigator-In-Charge, a video group did not convene and a summary report was prepared.

Possible actions by the pilot prior to the start of the video are not addressed in this report.

The recording began at 13:10:29 as the aircraft was holding short runway 32 at OXB. The pilot had just turned on the camera and was momentarily facing rearward toward the camera's lens. The pilot adjusted the camera slightly. The pilot then focused his attention toward the instrument panel. At times, the pilot glanced down toward his lap at an unseen item. Between 13:10:57 and approximately 13:11:25, the pilot made entries in an electronic flight book (EFB) application on an iPad which was mounted between the aircraft's two yokes.

Around 13:11:27, the pilot advised an approach controller that he was ready to copy an IFR clearance. The controller issued an IFR clearance, departure frequency and transponder code and the pilot read back the clearance. At 13:12:17, the controller began advising the pilot that his read back was correct and stated the "time now" was "One-three one-two forty."

Around 13:12:25, the passenger made an attempt to close the passenger door which was in a cracked open position. The pilot diverted his attention and leaned over the passenger and began to attempt to close the aircraft's door. The pilot made four attempts to close the aircraft's door. The fourth attempt succeeded in shutting the door. Around 13:13:09, the passenger began struggling to latch the door handle associated with the door. The pilot advised the passenger with comments such as "all the way- all the way- all the way" and "keep liftin' till it clicks." Around 13:13:19, the pilot then took over the actions related to closing the door. Moments later, when the door handle became visible, it was in the latched position. The pilot stated, "we'll get the hang of that." Overall, the pilot and passenger spent about 1 minute closing the aircraft's door.

Around 13:13:25, the pilot stated, "kay- brakes released." The pilot focused his attention back toward the instrument panel and adjusted a setting on a panel mounted Garmin 530 nav com radio. The pilot began taxiing again and made a call clearing traffic on the OXB advisory frequency and the aircraft crossed the hold short line for runway 32 at 13:13:51. The pilot stated he did not see any aircraft on final approach to runway 32. The pilot checked that the window vent on the pilot's side and the door on the passenger side were shut as the aircraft continued to taxi onto runway 32.

Around 13:14:12, the aircraft began accelerating, manifold pressure, fuel flow and propeller RPM increased as seen on the instrument panel. The throttle position was not visible because of the camera's field of view.

At 13:14:27, the aircraft became airborne around the runway 32 aiming point markings. The manifold pressure gauge indicated around 28 inches mercury (inHg), the fuel flow around 20 gallons per hour (gph) and the propeller rpm indicator displayed about 2,550 RPM. A red light on the tachometer illuminated, indicating the propeller RPM briefly climbed to at least 2,600 RPM¹. During rotation, another aircraft made a traffic call for OXB on the OXB advisory frequency.

At 13:14:37, the pilot acknowledged that he was looking for the other traffic but did not have it in sight on the OXB advisory frequency. The aircraft continued to climb. Engine indications were similar as noted in the above paragraph.

At 13:14:39, the pilot reached with his right hand in the vicinity of the gear handle. Around the same time, the other traffic on OXB advisory stated they were going to “make a left 360 here ‘till ya get out.”

At 13:14:45, the pilot stated on OXB advisory, “okay- look- uhh we’re gunna have to make a quick return.” Almost immediately, the aircraft’s pitch attitude became lower, a flash of sunlight lit the propeller RPM indicator and it showed 2,432 RPM, manifold pressure indicated around 28 inHg, and fuel flow about 19 gph. The aircraft’s pitch attitude porpoised over the next nine seconds. The control column appeared to move in conjunction with the pitch attitude changes.

At 13:14:55, the pilot began a left bank turn. The pilot stated an expletive. The altimeter read about 200 ft MSL.

At 13:14:57, the aircraft was in a significant nose high attitude, still in a left bank turn. The airspeed indicator was briefly visible, but it was not possible to read the airspeed indication. Fuel flow indicated around 18 gph, manifold pressure indicated just under 30 inHg, propeller RPM varied between approximately 2,300 and 2,400 RPM for the next few seconds. The altimeter read about 300 feet MSL.

The aircraft continued in the left bank turn. During the left bank turn, the aircraft’s pitch attitude was above the horizon until around 13:15:04, when the nose became closer to the horizon. The altimeter read about 300 feet. Sunlight illuminated the tachometer briefly and 2,200 RPM was displayed.

The aircraft continued in a left bank turn, the pitch attitude was still nearly level with the horizon. At 13:15:08, the pilot stated to the passenger, “we got a problem.” The passenger asked, “what’s the matter?” The pilot made a call on OXB advisory, “hey Ocean City - we’re gunna have to make a quick return if we can even get back.” The pilot’s voice was strained. In the previous few seconds, the fuel flow indication had decreased and now indicated around 17 gph. The manifold pressure gauge showed around 30 in/Hg. Due to lighting conditions, it was not possible to see the RPM indication.

¹ A placard on the tachometer stated 2,600 RPM as a limit for a red indication.

At 13:15:13, just after completing the transmission on OXB advisory, a pitch oscillation occurred. The pitch oscillation occurred in conjunction with a movement of the control column in the fore and aft direction. The pitch oscillations seemed to be between a shallow nose low angle and a moderate nose high angle.

The aircraft continued in a left bank turn, the pitch attitude became slightly nose high. At 13:15:16, the pilot stated, "we're goin' in." Fuel flow indicated around 16 gph, manifold pressure indicated around 30 in/Hg. Due to lighting conditions, it was not possible to see the RPM indication.

Around 13:15:17, the left wing of the aircraft dropped slightly. The pilot leaned to the right, obscuring the camera's view of the instrument panel. A pilot on OXB advisory stated, "are you guys okay?" The pilot stated, "nope – we're goin' in."

The left wing remained low as the aircraft continued in a left turn. The left horn of the passenger's yoke was visible. The position of the left horn of the yoke was consistent with a right roll command. The aircraft continued banking left. Throughout this portion of flight, the pitch attitude appeared level with the horizon. It was not evident, at any time during the turn, other than the brief pitch oscillations that had occurred, that the nose was ever below the horizon for any significant amount of time.

The aircraft descended into an area of manicured grass and trees, next to a small pond. The pilot stated an expletive and leaned hard to the right, the left wing was still low.

In the final moment of flight, the aircraft had began rolling sharply right in coordination with a hard right roll control input by the pilot.

At 13:15:23, impact occurred with the right wing low as the nose of the aircraft was falling through a level pitch attitude to a negative pitch attitude. The fuel flow indicator read about 16 gph and the manifold pressure indicator displayed around 30 inHg. The tachometer showed 2,200 RPM.

The pilot's face struck the instrument panel upon impact. The pilot's head set flew off his head. Within the next second, the pilot and passenger's upper bodies moved violently in unison in a flail like motion. The aircraft spun to the right while sliding across a grassy area, dirt and debris trailed the aircraft. The cockpit space had retained its general shape, the door latch was visible in a locked position, the aircraft's cowling had deformed significantly. The aircraft continued to slide across the grass, narrowly missing a tree.

At 13:15:28, the aircraft came to rest and orange flames were immediately visible outside the aircraft on the left side of the cowling area. For the next three seconds, both the pilot and passenger's heads bobbed. At 13:15:31, the passenger's head

came quickly upright. The passenger's head moved left and right. At 13:15:34, the pilot's head came slowly upright. Orange flames enveloped the entire cowling area and greyish white smoke began filling the cockpit from the instrument panel area.

At 13:15:36, the passenger first touched the door handle. The passenger attempted to unlatch the door handle for the next eight seconds. The passenger then turned to the pilot. The pilot raised his head and looked around. The passenger knocked on the window a few times.

Reddish color flames were now visible near the cowling and greyish white smoke continued to fill the cockpit. At this time, neither the pilot or passenger was attempting to exit the aircraft.

At 13:16:27, about one minute after the aircraft came to rest, the passenger began attempting to open the passenger side door again. The passenger appeared to struggle with the door latch. By 13:16:29, the pilot had leaned over toward the right and lifted himself. The passenger continued to struggle with the door latch, the smoke in the cabin was now a darker grey color.

At 13:16:37, the pilot wiped his face, the passenger continued to attempt to unlatch the passenger side door. By 13:16:41, the pilot had now started manipulating the door handle. Smoke quickly grew thicker and darker in color. Flames were still visible in the cowling area. The pilot struggled to manipulate the passenger side door latch for the next 6 seconds. At 13:16:47, the door swung open as a result of the pilot's action. Some smoke dissipated from the cockpit as a result of the door opening.

At 13:16:52, the arm of a bystander appeared and began to assist the passenger with exiting the aircraft. By 13:16:56, the passenger had exited the aircraft.

The pilot moved himself to the right of the aircraft's cabin. At 13:17:00, the bystander began assisting the pilot with exiting the aircraft. By 13:17:14, the bystander pulled the pilot from the aircraft as thick, dark smoke filled the entire cockpit area. By 13:17:16, almost the entire video recording was obscured by thick, dark smoke.

Around 13:18:29, the smoke had lessened some, the bystander, reappeared and searched the aircraft for an unseen object. The bystander exited and a second bystander entered the cockpit area. The second bystander emerged from the cockpit with a fire extinguisher and began fighting the fire in the vicinity of the aircraft's cowl. By 13:19:44, the second bystander left the area. Smoke once again obscured the camera.

The video ended at 13:25:29 due to a file limit length and a second, sequential recording began. Times are still given as elapsed from the first recording.

Around 13:28:29, first responders had arrived.

No other video events were transcribed. The second recording ended at 13:40:29.

4.6. Summary of Electronic Files (.FIT)

The file associated with the crash was named “2018-06-29-08-10-51.fit.” This file contained GPS information that matched the accident flight. The file also contained altitude information recorded in meters which was converted to feet.

Figure 1 is a north-up oriented view of the aircraft’s location recorded by the Garmin VIRB during the accident flight. The GPS information originated at 13:11:16 near the runup area at runway 32. By 13:14:26, the aircraft had become airborne. The aircraft appeared to turn left from runway heading around 13:14:53. At this time, the GPS data still showed a climb trend. At 13:15:02, the GPS device recorded a maximum altitude of 305 feet. From there, altitude data showed a decreasing trend for the remainder of the recording as the aircraft continued to turn back toward OXB. In comparison to video events, impact with terrain occurred around 13:15:23. GPS data showed the aircraft continued to move northeast and came to a stop. GPS data was clipped after the aircraft came to rest.

Figure 2 is a Google Earth overlay showing the turn and descent profile of the aircraft after departing runway 32.

Figure 3 is a Google Earth overlay showing a top down perspective of the final portion of the accident flight. The diameter of the aircraft’s turn was approximately 1630 feet.

GPS data from the Garmin VIRB is provided as attachment 1 to this report and is given in comma separated value (.csv) format.

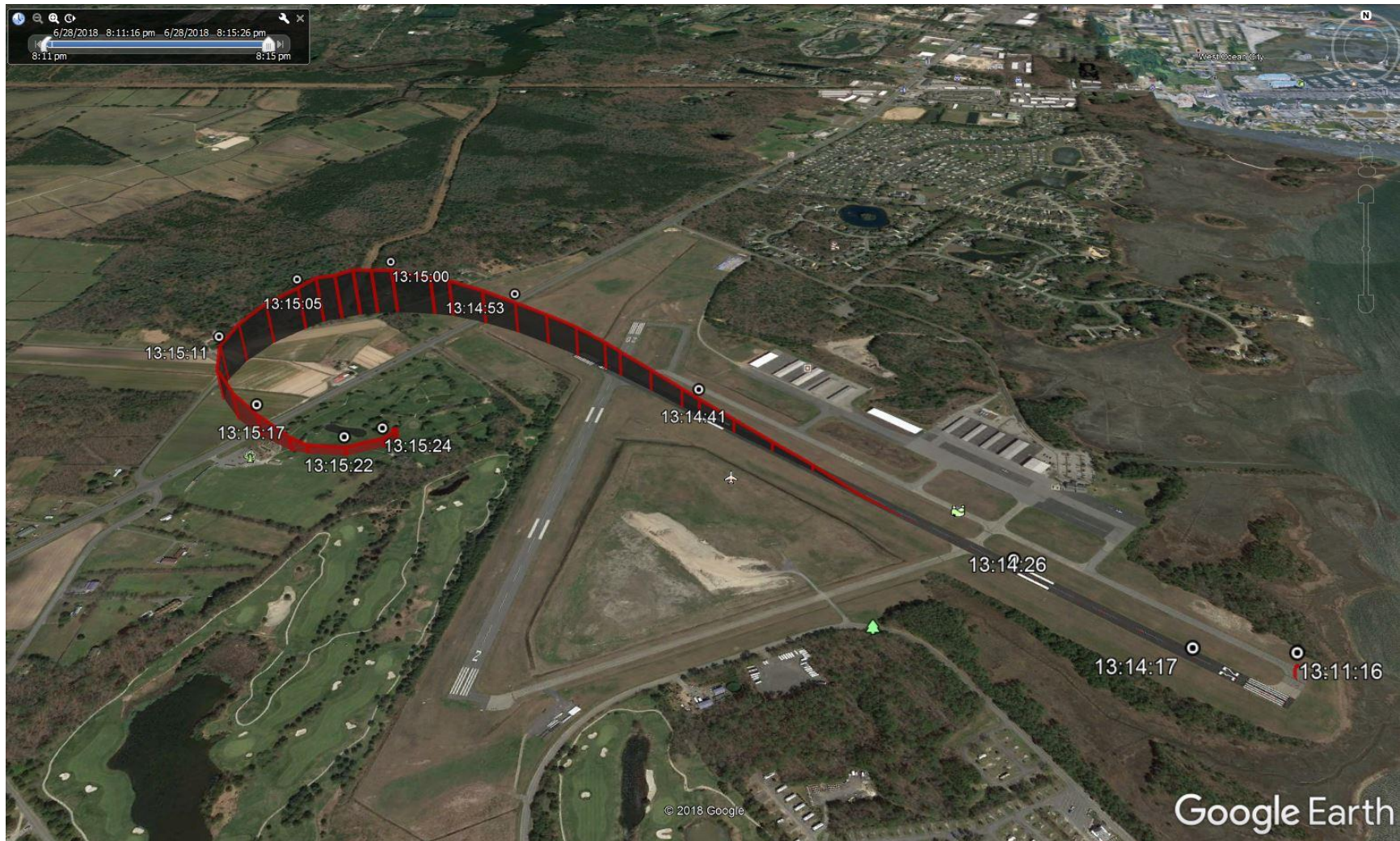


Figure 1: A north-up Google Earth overlay of the accident flight.

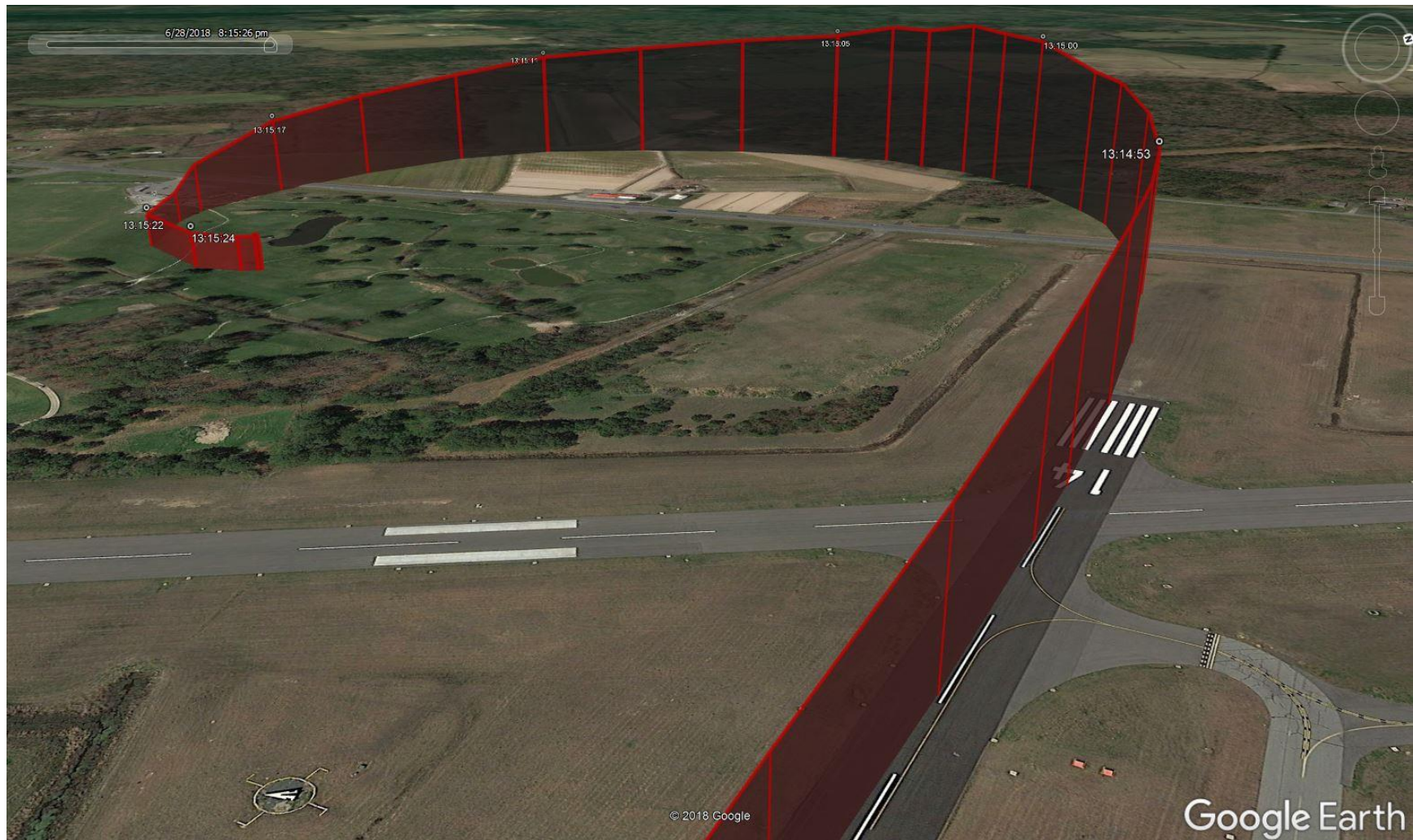


Figure 2: A north-up Google Earth overlay of the accident flight showing the turn and descent profile.

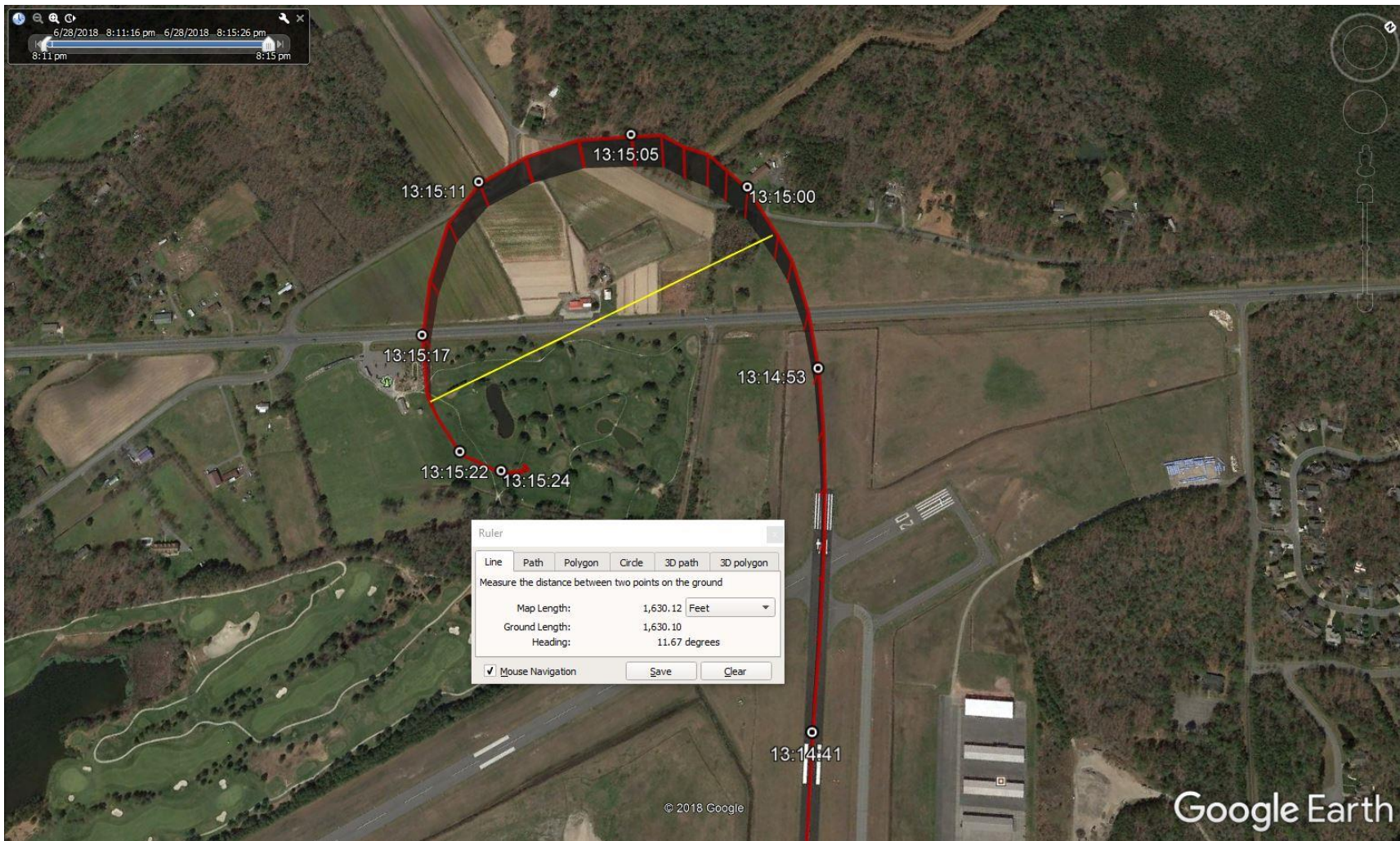


Figure 3: A north-up Google Earth overlay of the accident flight showing a top down perspective.