

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

November 17, 2020

Onboard Image Recorder & GPS Data

Specialist's Factual Report
By Sean Payne

1. EVENT

Location: Langley, WA
Date: January 12, 2019
Aircraft: Vans Aircraft RV-8A, N800KE
Operator: Private
NTSB Number: WPR19LA062

2. GROUP

A group was not convened.

3. SUMMARY

On January 12, 2019, about 1115 Pacific standard time, an experimental amateur-built Vans Aircraft Inc., RV-8A airplane, N800KE, sustained substantial damage when it impacted terrain while maneuvering to final approach at Whidbey Air Park Airport (W10), Langley, Washington. The private pilot was fatally injured, and the pilot-rated passenger was seriously injured. The airplane was privately owned and operated by the pilot, under the provisions of Title 14 *Code of Federal Regulations* Part 91, as a personal flight. Visual meteorological conditions prevailed, and no flight plan was filed. The flight originated from Snohomish County Airport (Paine Field) (PAE), Everett, Washington, about 1100 and was destined for W10.

4. DETAILS OF INVESTIGATION

On February 1, 2019, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following imaging device:

Recorder Manufacturer/Model: **Garmin VIRB 360**
Recorder Serial Number: **57HO10083**

4.1. Recorder Description

The Garmin VIRB 360 is a ruggedized, waterproof, 360-degree camera that supports up to 5.7K¹/30 FPS 16:9 format recordings and up to 4K spherical² stabilized recordings. The camera has four built in microphones to capture audio. Built in sensors provide AHRS³ like data that post-processing software uses to both stabilize the video and assist in creating spherical and augmented reality⁴ viewing experiences. The camera can record for about 1 hour on a single charge.

The device is also GPS capable and can record the unit's GPS position during operation. .FIT⁵ files can be exported from the device and used to overlay derived location parameters using Garmin video editing software. With additional third-party software, exporting other AHRS-like data recorded by the camera to support spherical playback can be exploited. Some of these parameters can include, pitch, roll and yaw of the camera as well as accelerations in three axes.

4.2. Recorder Damage

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the Garmin VIRB 360 had not sustained any heat or structural damage and the information was extracted from the device's memory card normally, without difficulty.

4.3. Video Files

One video file, exactly 30 minutes in length, captured the entire accident flight. Other files were recorded to the camera's SD card, however, these files were not included in this report.

4.4. Timing and Correlation

Timing of the transcript is expressed as Video Elapsed Time, which is time from the beginning of the recording.

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.

The video recorded a 360-degree view and was mounted just aft of the front seat pilot's right shoulder. Due to the mounting location, viewing area and nature of the aircraft's bubble canopy, an unobstructed view of all corners of the aircraft as well as portions of the instrument panel were visible. During video review, the camera

¹ 5.7K – A video with a resolution of 5,700 horizontal lines.

² Spherical Recording – A video file consisting of imagery data typically from a set of multiple cameras, that can be rearranged via software to produce an interactive viewing experience that allows the user to look in infinite directions in 3-D space.

³ AHRS – Attitude Heading Reference System.

⁴ Augmented Reality - An interactive experience of a real-world environment where the objects that reside in the real-world are enhanced by computer-generated perceptual information.

⁵ .FIT – A GIS data file used by Garmin GPS sport devices and Garmin software

viewing angle was changed in the manufacturer's playback software in order to view different areas of aircraft and to ascertain flight control surface movements.

All timing information is given as elapsed time, which is from the start of the accident recording and presented in the format MM:SS, where MM stands for the number of elapsed minutes and SS stands for the number of elapsed seconds.

The aircraft was of a tandem arrangement, where the pilot sits directly in front of a rear seat passenger. Both seats were occupied. The pilot was a male, seated in the front seat of the aircraft and appeared to be the sole manipulator of the flight controls during the entire accident flight. He was restrained by a four-point harness. The rear seat passenger was female and did not appear to manipulate the flight controls during the accident flight at any time. The rear seat passenger was restrained by a four-point harness.

The pilot was wearing dark gloves. The area around of the cockpit containing the throttle, propeller and mixture controls was very dark. At times, it was possible to see the black throttle knob, but during the accident sequence, the black knob was not visible due to lighting conditions. The pilot's glove did, however, have a light colored area. The light color area of the glove correlated with the sound of power setting changes during the accident recording.

The video began and the aircraft was taxiing from a hangar area at PAE. During taxi, nothing remarkable was noted and all aircraft systems appeared to be functioning normally.

Around 03:08, the aircraft stopped near the intersection of Taxiway A6 and Taxiway H1 and began a runup. The runup lasted until about 03:52, when the aircraft began taxing again. The sound of the engine during the runup portion was nominal. The pilot did not perform a flight control check or use a checklist.

Around 04:17, the aircraft came to a stop just short of Runway 16L. During this time the pilot's voice was audible, the tone was consistent with making a radio call to air traffic control, however, the words of the radio call were not determined. Around 04:50, the pilot crossed the hold short line for Runway 16L, moved toward the centerline of Runway 16L and began a rolling takeoff. The sound of the engine was nominal.

Around 05:22, the aircraft became airborne. Around 05:55, the aircraft began a right turn out from the traffic pattern. The aircraft continued climbing.

Around 06:30, the aircraft leveled around 1,800 MSL⁶, GPS data indicated the aircraft was on a groundtrack of around 295 degrees. Shortly thereafter, the aircraft turned to a groundtrack of around 311 degrees. GPS data showed the aircraft's

⁶ GPS altitude data was compared to indicated altitude data when possible. In general, GPS altitude agreed with indicated altitude data throughout the report.

groundspeed was around 175 knots after the pilot had made a power adjustment to a lower power setting.

Around 08:45, the aircraft settled into a groundtrack of around 350 degrees. Altitude remained around 1,800 feet MSL.

Around 09:20, a small airstrip consistent with W10 appeared off the nose of the aircraft. The aircraft was on a downwind leg for Runway 16 at W10. The pilot began descending through 1,700 feet MSL, the power setting was unchanged from the cruise portion of flight.

By 09:45, the aircraft had continued descending steadily to 1,380 feet when it was about abeam the Runway 16 numbers and turned onto an initial⁷ left base leg for Runway 16. The short crosswind leg could be described as a “racetrack pattern” and the by 10:06, the aircraft was abeam the Runway 16 numbers on the upwind. Altitude remained about 1,380 feet and GPS groundspeed indicated the aircraft had slowed to about 107 knots.

On the upwind leg, the aircraft continued descending. By 10:34, the aircraft was abeam the runway 34 numbers, had continued descending through about 1,000 feet MSL and turned onto a left crosswind leg for Runway 16.

By 10:56, the aircraft was established on a downwind leg now descending through 670 feet MSL. The ambient sound was consistent with the pilot having pulled the power back and groundspeed now indicated around 100 knots. During the downwind leg, the power setting was audible at slightly different levels and the recorded groundspeed settled around 78 knots. The aircraft continued descending, seemingly unabated by the pilot.

At 11:00, the flaps were extended a small unknown amount.

At 11:10, the flaps were extended to a second, larger amount.

Around 11:24, the aircraft was about abeam the runway 16 numbers and began a left turn to join a left base leg for runway 16. GPS altitude indicated the aircraft was around 540 feet MSL.

As the aircraft turned left base, another aircraft flew directly over head of the accident aircraft. The other aircraft was estimated to be about 1,000 feet above the accident aircraft as the accident aircraft turned onto left base. The other aircraft was traveling southbound. The actions of accident pilot did not indicate that he was aware of the other air traffic. The pilot’s head was not moved in the direction of the

⁷ The aircraft circled the airstrip once, as described. Left base shows the position of the aircraft in relation to the airstrip, however, at this time, the intention appeared to be to circle the airstrip and not fly a base to final leg.

passing aircraft. The rear seat passenger's head was also not moved in the direction of the passing air traffic.

Around 11:30, the sound of aircraft's engine lessened sharply to a state that sounded consistent with near idle. At this time, the pilot's gloved hand was visible making a motion that correlated in a reduction of power on the throttle control. The aircraft was in a left bank turn. GPS data indicated the altitude was 536 feet MSL and the groundspeed was 77 knots. The elevator surface was visible in the up (pitch up command) position.

At this time, the airspeed indicator pointed to a 1 o'clock position (below the start of the white arc). The aircraft was banked left about 45 degrees. The elevator control surface indicated the pilot was commanding positive pitch to the aircraft.

In the next second, the aircraft continued in a left bank turn. The sound of engine power returned. At nearly the same moment, the aircraft departed controlled flight, the left wing dipped rapidly. The nose of the aircraft began falling through the horizon. The rear seat female passenger was audible shouting "no!"

As the aircraft continued to depart controlled flight, the left bank angle increased rapidly. Due to lighting conditions, it was not possible to tell the pilot's control stick input, however, the 360 degree camera allowed investigators to view the aircraft's flight control surfaces at this time. As the aircraft departed controlled flight and headed toward impact, the right aileron was visible in the right aileron up condition (right roll command) and the elevator was seen in the up condition (pitch up command). The pitch up command appeared to be at the limit of the elevator's movement in the pitch up direction and continued in that manner until impact. The sound of engine power increased during this portion of flight.

By 11:36, pine trees began filling the camera's field of view. The aircraft was descending toward impact rolled almost 90 degrees left.

Within the next second, at 11:37, the aircraft's nose began impacting pine trees. The aircraft had begun to roll level (to the right) as it impacted pine trees. The impact was violent, and the pilot was tossed forward in his seat. Motion of the pilot's body suggested he was restrained by a four-point harness. The impact had tossed the pilot's torso forward significantly, however, it was unclear from the recording if the pilot's head impacted the control panel. In the next few image frames, the camera appeared to be tossed from the aircraft and spun rapidly until it came to rest near the wreckage.

During the impact sequence, the 360-degree camera view was rearranged in software to view the motion of the rear seat passenger. Just prior to impact, the rear seat passenger assumed a brace-like position. Upon entering the tree line, the rear-seat passenger brought her extremities inward and covered her face. Motion of the rear seat passenger's body suggested she was restrained by a four-

point harness. The rear seat passenger was tossed forward in her harness as impact occurred. Due to the violence of the impact, the camera was unable to record additional events with any useful clarity and the camera broke free from its mounting location as described in the paragraph above.

The camera continued to record until battery exhaustion, however, no other events were transcribed.

4.6. Associated GPS Data Files

The device recorded .FIT files. One .FIT file was associated with the accident flight and was parsed. Latitude and longitude, as well as GPS altitude data were recorded and overlaid on Google Earth in the following figures. At times, the recorded GPS altitude displayed values below the WGS84 datum for this region. GPS data was not corrected. All times are given in UTC.

Figure 1 is an overview of the entire accident flight. The overlay is oriented north-up.

Figure 2 is an overview of the accident region.

Figure 3 is a top down view of the final portion of the accident flight. Because the GPS data recorded the altitude as under the WGS84 datum for this area, a yellow line was added to clarify the final tracklog points. A yellow circle denotes the area in which the physical wreckage came to rest.

The data parsed from the .FIT file is provided as attachment 1 to this report and can be found in the public docket for this accident.



Figure 1: A Google Earth overlay oriented north-up showing the entire accident flight.

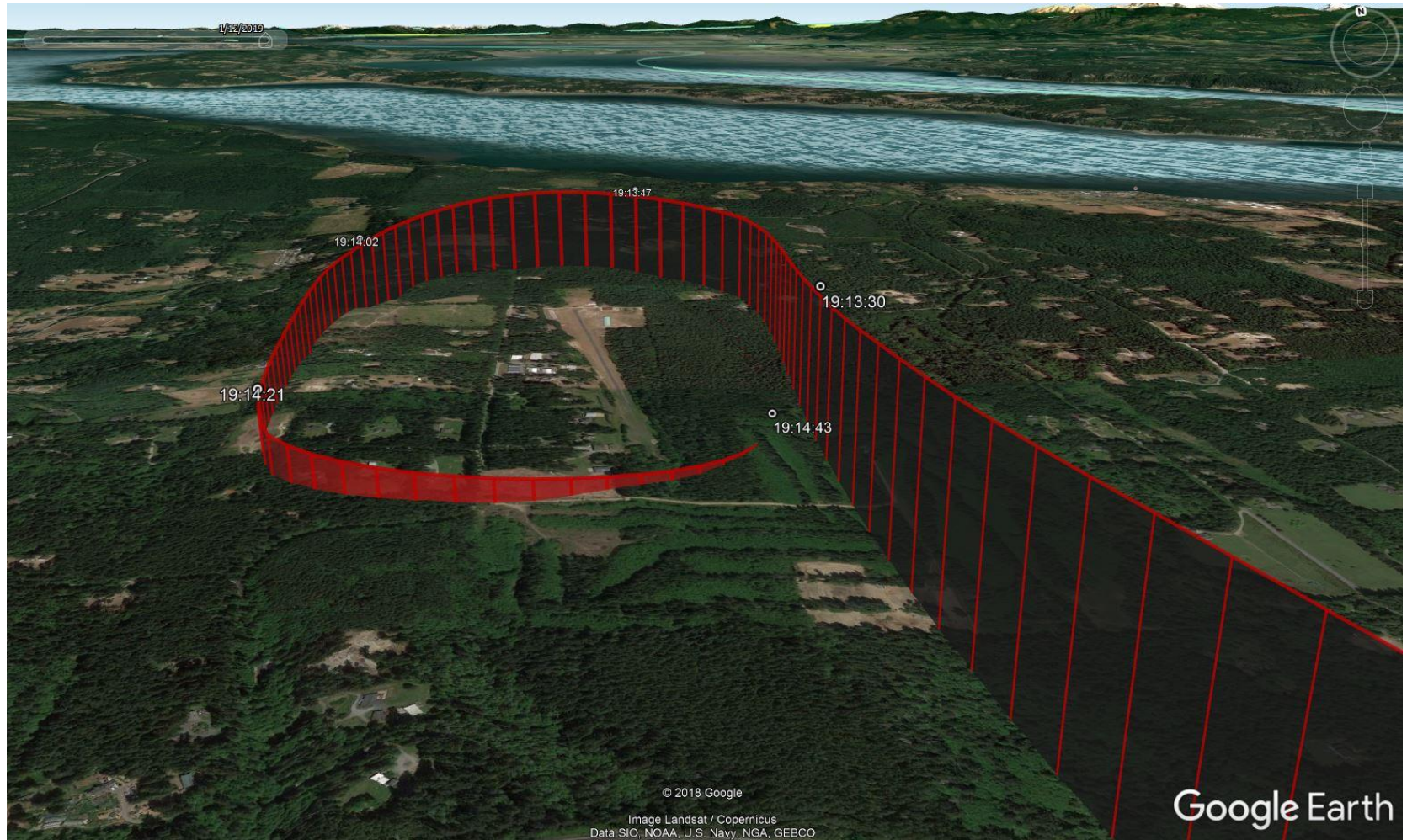


Figure 2: A Google Earth overlay oriented north-up showing the accident region. Note that GPS data falls under the WGS84 reference datum at approximately 19:14:43 UTC.

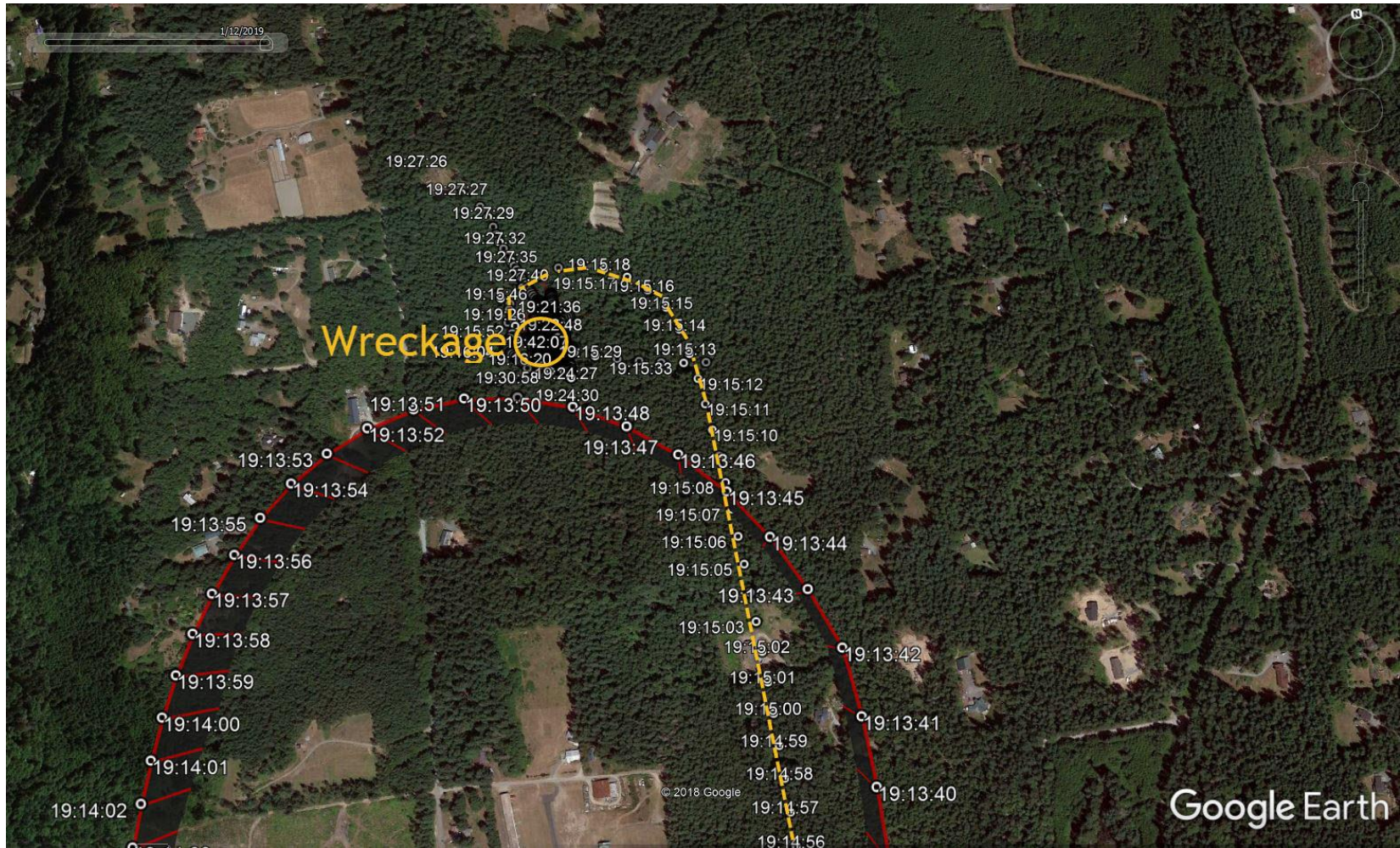


Figure 3: A Google Earth overlay oriented top down showing the accident location. A yellow dotted line was added to indicate the final tracklog points as they were represented below the WGS-84 datum.