

HISTORY OF FLIGHT

On December 10, 2015, about 1347 mountain standard time, an experimental amateur built, RV-7 airplane, N307AB, experienced an in-flight break up and then impacted terrain about 3 miles west of General Dick Stout Field Airport, Hurricane, Utah. The airline transport pilot and passenger were fatally injured, and the airplane sustained substantial damage. The airplane was registered to and was being operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions existed near the accident site about the time of the accident, and no flight plan had been filed. The local flight departed from an unknown airport at an undetermined time.

Several witnesses located near the accident site stated that they heard the airplane's engine and that it sounded like it was making power changes. The witnesses added that they saw airplane debris floating in the air. One witness stated that the engine was running during the entire descent and that he also observed the airplane spiraling and descending in a cork-screw type maneuver. Another witness reported seeing the airplane inverted at a low altitude just before impact.

PERSONNEL INFORMATION

The pilot, held an airline transport pilot certificate with airplane multi-engine land, single-engine land, instrument, and instructor single-engine land ratings. The pilot was issued a first-class Federal Aviation Administration airman medical certificate on October 22, 2015, with the limitation that he must have glasses available for near vision. The pilot reported on his most recent medical certificate application that he had accumulated 17,359 total flight hours, 403 flight hours of which were accumulated in the previous 180 days.

AIRCRAFT INFORMATION

The two-seat, low-wing, fixed-gear airplane, was assembled in 2011, and it was issued an airworthiness certificate certified for aerobatic maneuvers in March 2011. It was powered by an experimental 180-horsepower ECI/Titan IO-360 reciprocating engine. The engine was equipped with a Whirlwind 200RV propeller. The last documented inspection was a conditional inspection that was completed on May 15, 2015, at an airframe time of 258.9 hours.

The airplane's manufacturer website listed the maximum load factor as positive +6 g and a minimum load factor as -3 g. Additionally, the Pilot's Operating Handbook lists the maneuvering speed (Va) as 142 mph. In the remarks, it stated, "do not make full control movements above this speed. Full elevator deflection will result in a 6g load at this speed." Any speed greater than Va with full control application could result in g-loads that exceeded the design limits.

METEOROLOGICAL INFORMATION

The 1355 recorded weather observation at Saint George Regional Airport, Saint George, Utah, located about 12 miles west-southwest from the accident site, reported calm wind, visibility 10 statute miles, clear skies, temperature 12° C, dew point -2° C, and an altimeter setting of 29.87 inches of mercury.

The accident site was located between a cold front to the northwest and a high-pressure area to the southwest, in an area of strong-pressure gradient. A model sounding, which included a wind profile, for the area over the accident site about the time of the accident, estimated that the surface horizontal wind speed was estimated to be 220° at 8 knots, with winds increasing in speed with height and veering to the west. The mean 0-to-18,000 ft mean sea level (msl) winds were from 250° at 52 knots. The model supported light-to-moderate clear air turbulence from 6,400 through 8,000 ft msl, and mountain wave development from 10,000 to 12,000 ft msl.

Pilot reports noted evidence of mountain wave activity in the region but with moderate-to-severe turbulence near the accident site; at 6,500 ft msl, consistent with the model sounding. An AIRMET for moderate turbulence below 18,000 ft, was active over the accident site at the accident time. No SIGMET was active for the accident site at the accident time.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was located about 4.2 miles southwest of Hurricane, Utah, on flat sagebrush-covered terrain on top of a mesa. The debris path was about 1,460 ft long and 450 ft wide. All major components of the airplane were located in the debris path.

The main airplane wreckage was located almost at the northern extent of the debris field and included the fuselage, engine, right wing, half of the left wing, a majority of the left and right elevators, and the lower half of the rudder. The vertical stabilizer with the upper half of the rudder attached was located at the southern extent of the debris field, located about 1,420 ft south-southwest of the main wreckage. The left and right horizontal stabilizers were located about 850 ft and 790 ft, respectively, south of the main wreckage. The left aileron was located about 430 ft south-southwest of the main wreckage, and the left outboard wing was located about 320 ft south-southwest of the main wreckage.

The main wreckage was found inverted. There were no noticeable ground scars leading up to the wreckage. The fuselage was intact, but the upper half was crushed. The canopy frame was separated from the airframe and located about 55 ft northeast of the main wreckage. Most of the acrylic canopy was fractured from the frame and found in many pieces in the debris field. The engine remained attached to the fuselage. One of the composite propeller blades was fractured from the hub and the other blade was missing the tip portion. Debris consistent with propeller material was found around the main wreckage. The examination of the engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. The main landing gear remained attached to the lower fuselage, and there was some deformation at the attachment points.

The entire right wing remained attached to the fuselage with the flap and aileron attached. The right flap was in the "up" position. The outboard half of the right wing was deformed downward about 15° to 20° at the flap/aileron junction, located about 57 inches outboard of the wing attachment point. The upper and lower wing skins were buckled around the area where the wing was deformed downward. The right fiberglass wingtip remained attached to the wing but was splayed open at the trailing edge.

The inboard half of the left wing remained attached to the fuselage with the flap attached. The left flap was in the "up" position. The outboard half of the left wing had separated at the flap/aileron junction located about 57 inches outboard of the wing attachment point. The main spar fractured at the location where the upper and lower spar caps undergo a net section decrease from inboard to outboard. The outboard half of the left wing was mostly intact with minimal damage noted.

MEDICAL AND PATHOLOGICAL INFORMATION

The Utah Department of Health, Office of the Medical Examiner, conducted an autopsy on the pilot. The medical examiner determined that the cause of death was "blunt force trauma."

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing specimens from the pilot. Testing results were negative for carbon monoxide, cyanide, and volatiles. The testing detected doxylamine in the liver but not in the blood and ibuprofen in the blood.

Doxylamine is an over-the-counter antihistamine medication that can be used in combination with decongestants and other medications to relieve sneezing, runny nose, and nasal congestion caused by the common cold and can be sedating. Ibuprofen is used to reduce fever and to relieve minor aches and pains from headaches, muscle aches, arthritis, the common cold etc.

TESTS AND RESEARCH

Structures Examination

A postaccident examination of the inboard and outboard wing sections at the fracture location revealed that the fracture exhibited damage and deformation consistent with the separation of the outboard portion of the wing in a downward direction. The horizontal stabilizer forward spar fractured about 2 inches outboard of the side of the fuselage on both sides. Both of the horizontal stabilizer spar caps were deformed down and aft at the fracture location. The elevators were deformed down and aft matching the spar deformation.

The left and right horizontal stabilizers were found in the debris field. The outboard elevator hinges remained attached to both stabilizers and the hinges were pulled from the elevators. About 18 inches of the outboard portion of horizontal stabilizer rear spar on each side remained installed in the horizontal stabilizers. The upper and lower skins separated from the remainder of the rear spar along the rivet lines. There was buckling damage on the lower skin of both horizontal stabilizers consistent with the stabilizers separating downward.

Control continuity was established from the cockpit controls to the elevators and the right aileron. The left aileron control rod aft rod end was fractured from the control rod. The rod end remained attached to the aileron control horn at the inboard aileron hinge. The left aileron controls cables were fractured and had a splayed, broom-strawed appearance, consistent with tension overload. Control continuity was established from the control stick in the cockpit to the left aileron bell crank and aft to the fracture point on the left aileron control rod. The rudder cables were jammed somewhere in the fuselage, and control continuity could not be established, but the cables remained attached at the rudder and the pedals.

All the fractures exhibited a dull, grainy appearance consistent with overstress separation. There was no evidence of progressive or pre-existing fractures on any of the parts.

Electronic Devices

No flight data for the accident flight could be recovered from the electronic devices found in the wreckage. However, a GoPro Hero 4 camera, which had sustained significant impact damage, revealed two files recorded on previous flights in which the accident airplane performed an aileron roll to the right.

Radar Data:

A review of the radar track from commercially available sources revealed two tracks that were consistent with the accident airplane. The first track was 17 minutes long and ended at 1332 when the airplane was at 6,150 ft. Altitudes throughout the track varied from 6,150 to 9,350 ft, and the groundspeed varied between 24 and 168 knots. Most of the first half of the track show the airplane climbing, and the second half of the track shows the airplane descending. The track shows the airplane flying west and then performing a couple of circling maneuvers and in slow flight. The airplane then turned south and shortly thereafter, it makes a right northerly turn.

The second track, which may be associated with the accident airplane, started at 1336 when the airplane was at 6,625 ft. The data only shows 1 minute of flight. The heading is nearly south, and the groundspeed range is between 127 and 133 knots.

Weight and Balance

The distribution of the airplane contents throughout the debris field prevented an accurate weight and balance assessment and the airplane's most recent weight and balance records were not located. Therefore, an estimated weight and balance calculation was conducted. According to the airplane's kit manufacturer, the airplane had a maximum factory basic weight of 1,114 lbs and a useful load of 686 lbs. The medical examiner reported that the total weight of the occupants was 306 lbs. Assuming a total fuel load of 42 gallons, the airplane would have been about 128 lbs below its maximum gross weight of 1,800 lbs at the time of the accident.