



**NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Washington, D.C. 20594

**STRUCTURES GROUP CHAIRMAN'S FACTUAL REPORT**

September 20, 2016

**A. ACCIDENT:**

**WPR16FA036**

Operator: Private  
Location: Hurricane, Utah  
Date: December 10, 2015  
Time: 1347 Mountain Standard Time (MST)  
Aircraft: Vans Aircraft, Inc. RV-7  
Registration: N307AB

**B. STRUCTURES GROUP**

Chairman: Clinton R. Crookshanks  
National Transportation Safety Board  
Denver, Colorado

Member: Mark Rushton  
Federal Aviation Administration  
Salt Lake City, Utah

**C. SUMMARY**

On December 10, 2015, about 1347 mountain standard time, a Barnett Allen Experimental amateur built, Van's Aircraft, Inc., RV-7 airplane, N307AB, experienced an inflight break up, and sustained substantial damage when it impacted terrain about 3 miles west of the General Dick Stout Field Airport, Hurricane, Utah. The airplane was registered to and operated by the pilot under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91. The airline transport pilot and passenger were fatally injured. Visual (VMC) meteorological conditions prevailed, and no flight plan had been filed. The local personal flight departed from an unknown airport at an undetermined time.

## **D. DETAILS OF THE INVESTIGATION**

### **1.0 Aircraft**

Manufacturer's Serial Number (MSN): 73395

The Van's Aircraft, Inc. RV-7 is a two-place side-by-side, single engine, propeller driven, experimental amateur-built airplane (Figure 1<sup>1</sup>). The all metal airplane is equipped with low wings, a conventional tail, and conventional landing gear. The airplane is 20 feet, 4 inches long, 5 feet, 10 inches tall at the tail and has a wing span of 25 feet. The manufacturer sells all the parts necessary to build the airframe as a kit that is assembled by the buyer. The airplane was designed with a maximum load factor of 6 g and a minimum load factor of -3 g in accordance with an aerobatic category airplane. Van's Aircraft, Inc. lists a stall speed of 64 mph, maneuvering speed of 142 mph and a never exceed speed of 230 mph for the RV-7 airplane.

The accident airplane kit was purchased from Van's Aircraft, Inc. in December 2010 by Allen Barnett. Assembly of the kit was completed in 2011 and the Airworthiness Certificate was issued on March 5, 2011, identifying the airplane as a Barnett Allen S RV-7. The accident airplane was equipped with an ECi O-360 engine and a Whirlwind 200RV propeller. The accident pilot purchased the airplane from the builder on February 25, 2014. See Figure 2 for a photo of the accident airplane.

### **1.1 Wreckage Examination**

The airplane wreckage was located about 4.2 miles southwest of Hurricane, Utah, in flat sagebrush covered terrain on the top of a mesa. The debris field was about 1460 feet long by about 450 feet wide and all primary structures of the airplane were accounted for in the debris field (Figure 3).

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 location of the larger, identifiable pieces of the wreckage were located with a GPS unit as shown in Table 1 at the end of this report. The southern extent of the debris field was marked by the vertical stabilizer with the upper half of the rudder attached and was located about 1420 feet south-southwest of the main wreckage. The left and right horizontal stabilizers were located about 850 feet and 790 feet, respectively, south of the main wreckage. The left aileron was located about 430 feet south-southwest of the main wreckage and the left outboard wing was located about 320 feet south-southwest of the main wreckage.

The main wreckage was inverted at the impact location. 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 airplane and found about 55 feet northeast of the main wreckage. Almost all of the canopy acrylic was fractured from the frame and found in many pieces in the debris field. Several pieces of the acrylic had scratches and scuff marks on the interior surface. 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 the propeller material was found around the main wreckage. The main landing gear remained attached to the lower fuselage though there was some deformation at the attach points.

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<sup>1</sup> All figures are presented in Appendix A.

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°-20° at the flap/aileron junction located about 57 inches outboard of the wing attach point (Figure 4). The upper and lower wing skins were buckled around the area where the wing was deformed down. 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 wing fractured at the flap/aileron junction located about 57 inches outboard of the wing attach 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 in the debris field. Examination of the inboard and outboard wing sections at the fracture location exhibited damage and deformation consistent with the departure of the outboard wing in a downward direction. The left fiberglass wingtip was intact but had separated from the wing along the rivet line at the inboard edge. The left wingtip strobe light was separated and found in the debris field. The left aileron was separated from the outboard wing section and found in the debris field with minimal damage. The aileron hinges were intact and the hinge attach brackets were separated from the wing rear spar along the rivet lines.

The center portion of the horizontal stabilizer forward spar, most of the horizontal stabilizer rear spar, and most of the left and right elevators remained attached to the fuselage (Figures 5 and 6). The horizontal stabilizer forward spar fractured about 2 inches outboard of the side of the fuselage on both sides. A portion of the left horizontal stabilizer lower skin and the root rib remained attached to the forward spar. The horizontal stabilizer forward spar upper spar cap was deformed down at the fracture location and the lower spar cap was deformed down and aft. Most of the horizontal stabilizer rear spar was intact and attached to the fuselage though each side was deformed down (at least 45°) and aft. The rear spar fractured about 2 inches outboard of the end of the upper and lower spar reinforcement straps on both sides. The center portion of the rear spar and the fuselage attach fittings were deformed and rotated forward about the stabilizer shelf on the fuselage. The left and right elevators remained attached at the control horns on the inboard ends. The center hinges were separated from the horizontal stabilizer rear spar and remained installed on the elevators. The elevators were deformed down and aft matching the rear spar deformation. The elevator trim tab remained attached to the left elevator. The lower portion of the rudder remained attached to the fuselage. There were impact impressions on the left and right sides of the rudder that matched the elevators in their deformed position. The vertical stabilizer forward spar was fractured just above its attachment to the horizontal stabilizer front spar. The vertical stabilizer rear spar was fractured and twisted just above the stabilizer shelf consistent with the vertical stabilizer separating leading edge left.

The left and right horizontal stabilizers were found in the debris field. The outboard elevator hinges remained attached to both 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. The upper skins of both horizontal stabilizers had only minor damage. The left elevator counterweight and about 6 inches of upper and lower elevator skin separated as a unit from the left elevator. The right elevator counterweight and about 6 inches of

upper and lower skin separated from the right elevator though the portions of the upper and lower skins were separated from the counterweight. There was an oval shaped black transfer mark on the lower surface of the right elevator counterweight consistent with the shape and material of the tail wheel. The vertical stabilizer with the upper portion of the rudder attached was found the farthest from the main wreckage. The vertical stabilizer was mostly intact and undamaged. The rudder trailing edge was separated and the left and right skins were splayed open. The rudder trailing edge rivets were installed but had pulled through the rudder skin on the shop head side. The rudder counterweight was separated from the upper end of the rudder and found about 130 feet southeast of the main wreckage and about 1370 feet northeast of the upper rudder.

Control continuity was established from the stick in the cockpit to the elevators and the right aileron. The left aileron controls cables were fractured and had a splayed, broomstrawed appearance consistent with tension overload. The rudder cables were jammed somewhere in the fuselage so continuity could not be established but the cables remained attached at the rudder and pedals.

All the fractures examined had a dull, grainy appearance consistent with overstress separation. There was no evidence of progressive or pre-existing fracture on any of the parts examined. Many of the rivets examined appeared to be not sufficiently driven.

Two Grand Rapids Technologies electronic flight information system (EFIS) units, an Avidyne traffic advisory system (TAS) unit, and a GoPro camera were recovered from the wreckage and shipped to the NTSB Vehicle Recorders Laboratory.

Wreckage	Latitude (N)	Longitude (W)
Vertical Stabilizer	37° 8.492'	113° 21.474'
Left Horizontal Stabilizer	37° 8.567'	113° 21.378'
Right Horizontal Stabilizer	37° 8.578'	113° 21.327'
Right Elevator Skin	37° 8.594'	113° 21.377'
Left Elevator Counterweight	37° 8.613'	113° 21.353'
Left Strobe Light	37° 8.626'	113° 21.351'
Left Strobe Light	37° 8.619'	113° 21.341'
Left Strobe Lens	37° 8.629'	113° 21.352'
Left Wingtip	37° 8.637'	113° 21.377'
Left Aileron	37° 8.639'	113° 21.353'
Magnetometer	37° 8.649'	113° 21.339'
Right Elevator Counterweight	37° 8.627'	113° 21.335'
Left Outboard Wing	37° 8.657'	113° 21.382'
Canopy Segment	37° 8.640'	113° 21.355'
Canopy Segment	37° 8.643'	113° 21.366'
Canopy Segment	37° 8.641'	113° 21.652'
Canopy Segment	37° 8.647'	113° 21.351'
Antenna	37° 8.678'	113° 21.350'
Rudder Counterweight	37° 8.691'	113° 21.340'
Main Wreckage	37° 8.706'	113° 21.359'
Canopy Frame	37° 8.712'	113° 21.350'

Table 1 – Airplane wreckage locations