



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

October 26, 2017

ENGINE/AIRFRAME EXAMINATION SUMMARY

WPR17FA134

This document contains 4 embedded photos.

A. ACCIDENT

Location: Arlington, AZ
Date: June 27, 2017
Aircraft: N731RV; Vans RV-7
NTSB Investigator-in-Charge: Maja Smith

On June 27, 2017 about 0849 mountain standard time, a Vans RV-7, N731RV, was destroyed when it impacted mountainous terrain near Arlington, Arizona. The pilot who was the registered owner of the airplane, and a pilot-rated passenger sustained fatal injuries. The flight was operated under the provisions of 14 Code of Federal Regulations (CFR) Part 91, as a personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan had been filed. The local flight originated from Buckeye Municipal Airport, Buckeye, Arizona about 0835.

On June 27, 2017, at 1316, an Alert Notice (ALNOT) was issued for the airplane after family members of the pilot became concerned when he did not arrive at his intended destination. At 1810, the airplane wreckage was found by the sheriff's department in the Gila Mountains.

There were no reported witnesses to the accident.

The airplane was recovered to a secure location for further examination.

B. PARTICIPANTS

Jack Vanover-NTSB
Mark Pritchett-FAA-FSDO
Mitch Lock-Van's Aircraft
Mark Platt -Lycoming

C. SUMMARY

Examination of the recovered wreckage was conducted on October 26, 2017 at the facilities of Air Transport, Phoenix, Arizona, by the National Transportation Safety Board (NTSB) and parties to the investigation.

D. DETAILS OF THE EXAMINATION

a) Airframe

The fuselage was mostly destroyed and was crushed forward. Both wings displayed accordion crushing on the leading edge. Front roll over bar and partial canopy frame located with main wreckage but with very little plexiglass located in the wreckage. Main wing spar and center section remained attached and mostly intact. Damage to the outer section of the wing spars were noted. Both flaps remained attached to the fuselage, but were mostly crushed. Both ailerons were separated from the wing and displayed extensive impact damage.

The empennage was found with the main wreckage, but the vertical stabilizer, rudder, and counterweight were located about 1.3 miles from the main wreckage. The Rudder was separated into three sections. Approximately 33% of the right-side rudder skin was not recovered from the accident site.



Figure 1: View of Empennage Section Found About 1.3 Miles from Main Wreckage.

The rudder counter balance was intact with the upper 25% of the rudder assembly. The upper rudder attaches bearing remained intact with the hinge brackets ripped from the Vertical Stabilizer (VS) rear spar. The middle rudder bearing remained intact and attached to the rudder along with the upper portion of the VS rear spar attach was broken just above the VS rear spar doubler. The bottom section of the rudder broke away at the failure of the bottom bearing. The vertical stabilizer forward spar broke away from the horizontal stabilizer front spar at the spar attach point. The VS rear spar broke into two sections.

The three pieces of the empennage that separated and most of the empennage was shipped to the NTSB materials lab for further examination.

Noted that the Van's Aircraft supplied chains and spring system to attached for rear wheel steering was not installed. An aftermarket tail wheel link was installed. Rudder cable attachments to rudder horn had broken away from rudder horn. Screws, nuts and cotter pins intact.

Possible snarge (bird matter and fragments) attached to underside of right horizontal stabilizer ahead of center bearing attach point. Possible bird feathers were found in the cockpit under the passenger seat. Bone matter found in engine bay between cylinders and on the oil cooler. Possible snarge also found on upper rear bulkhead behind the pilot's head.



Figure 2: View of Snarge Found on Horizontal Stabilizer.

The snarge and bird feathers were collected and will be shipped to the Smithsonian for examination and classification.



Figure 3: View of Feather Found in Empennage.

b) Engine

The engine is a four-cylinder, air cooled, direct drive, horizontally opposed, carbureted, internal combustion engine. The engine is rated at 180hp and 2,700rpm.



Figure 4: View of Engine Data Plate

The engine was severely fragmented as a result of impact energy sustained during the collision with terrain. The No. 1 and 3 cylinders were displaced from their respective mounting pads. The front section of crankcase along with the forward crankshaft section was separated. As a result, manual crankshaft rotation could not be accomplished. Mechanical continuity of the rotating group and internal mechanisms were established visually during the limited disassembly and examination of the engine. There was no evidence of lubrication deprivation or contamination found. There were no signatures or conditions observed consistent with any preaccident catastrophic mechanical malfunction. The camshaft was intact and each of the camlobes appeared normal in their shape. The accessory gears including the crankshaft gear, bolt and dowel were intact and remained undamaged by any pre-impact malfunction. The combustion chambers of the cylinders remained undamaged by any foreign object ingestion. The gas path and combustion signatures observed at the spark plugs, combustion chambers and exhaust system components displayed coloration consistent with normal operation. The valve train that remained intact was undamaged by any pre-mishap mechanical malfunction.

The two-bladed constant speed propeller remained attached at the crankshaft flange. The crankshaft had been separated from the engine at the No. 1 crank cheek due to the absorption of impact energy.

One of the propeller blades remained attached to the propeller hub and the opposing blade was separated. The propeller blades displayed leading edge gouging, chordwise striations

across the cambered surface. The signatures were consistent with the absorption of rotational forces applied at the crankshaft at the time of impact.

The various fuel supply lines at the engine and firewall were subjected to the forces of impact energy and had become displaced at their respective fittings when the engine separated from the airframe, thus compromising the fuel system. There was no fuel observed.

The carburetor was displaced from the engine due to the forces of impact. The portion that remained attached at the mounting pad was secure. The fracture surface signatures were consistent with overload. The throttle/mixture controls were found securely attached at their respective control arms of the carburetor.

The carburetor was opened for examination. The fuel bowl remained free of visible contaminants. The float assembly remained secure at the mounting. The right plastic pontoon was fractured. The float pontoons exhibited no evidence of rubbing against the wall of the bowl. All internal locking tabs and safety devices of the carburetor were in place and properly secured. The fuel inlet screen was found properly installed and free of contamination. No external fuel staining was observed.

The fuel pump was displaced from the engine. The portion of mounting flange remained secure at the mounting pad. The fracture surfaces exhibited signatures consistent with overload. The fuel pump was opened for examination. The fuel pump remained free of internal mechanical malfunction and obstruction to flow. The diaphragm was ruptured where it had been pulled from the actuating stem resulting from impact forces.

The spark plugs sustained varying degrees of impact damage; the spark plugs were removed, examined and photographed. The spark plug electrodes remained mechanically undamaged, and according to the Champion Spark Plugs "Check-A-Plug" chart AV-27, the spark plug electrodes displayed coloration consistent with normal operation.

The vacuum pump was displaced from the engine at the mounting pad. The fracture surface signatures were consistent with overload. The drive was intact.

The starter was displaced from the engine and destroyed.

The alternator was detached from the engine and destroyed.

The oil suction screen was found secure and uncontaminated by any preaccident debris. The oil filter was detached and crushed. There was no evidence of any preaccident lubrication system contamination.