

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594**

SUMMARY OF AIRFRAME AND ENGINE EXAMINATION

CEN21FA007

A. ACCIDENT

Location: Telluride, Colorado
Date: 10/5/2020
Time: 1304 MDT
Aircraft: Beech S35 (S/N D-7422) N4444K

B. PARTICIPANTS

David Bowling	Jennifer Barclay
Senior Air Safety Investigator	Textron Aviation
National Transportation Safety Board	Wichita, Kansas

C. ACCIDENT SUMMARY

On October 5, 2020, about 1304 mountain daylight time, a Beech S35 airplane, N4444K, was substantially damaged when it was involved in an accident near Telluride, Colorado. The pilot and 1 passenger sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The airplane took off on a planned VFR cross-country flight from runway 27 at the Telluride Regional Airport (TEX). Weight and balance calculations showed the airplane was about 300 pounds under maximum gross takeoff weight, which included full fuel tanks, the two occupants, and all baggage. Automated Dependent Surveillance – Broadcast (ADS-B) data showed a normal takeoff and climb to the west and subsequent turn to the east into a box canyon. The ADS-B data showed the airplane in a steady climb for about 8-miles into the canyon, then a right turn to the south just prior to impact. There were no known radio distress calls heard from the pilot after takeoff.

The accident site was located amidst rugged mountainous terrain, about 8 miles east of TEX. The elevation of TEX was 9,069 feet msl. The elevation of the accident site was 11,823 feet msl. The surrounding terrain to the north, east, and south was higher than the accident site elevation, with peaks ranging from about 12,000 to 14,000 ft. The airplane wreckage showed evidence of a nearly vertical impact. Most of the forward section of the fuselage was crushed, and both wings showed impact damage across the leading edges of their spans. The wreckage

was recovered and transported to a secure facility for detailed examinations of the airframe, engine, flight controls, and systems.

D. DETAILS OF AIRFRAME AND ENGINE EXAMINATION

Following the accident, the airplane was recovered to Beegles Aircraft Services, LLC, Greeley, Colorado for storage. On March 3, 2021, detailed examinations of the airframe, flight controls, and engine were conducted. The examinations were led by an NTSB senior air safety investigator, with assistance from an air safety investigator from Textron Aviation and an airframe and powerplant mechanic from Beegles Aircraft Services, LLC.

E. SUMMARY OF AIRFRAME EXAMINATION

Beech S-35, serial number D-7422

The airplane was laid out in one of Beagles Aircraft's' hangar facilities. The left and right wings were separated from the fuselage. The engine, cockpit, baggage compartment, fuselage, and right elevator were attached. The right rudder, left elevator, rudder, and tail cone were separated. Two of the three propeller blades were present. They had been broken out of the propeller hub at the cuffs. All the components were photographed.



Figure 1, Airplane Wreckage in Hangar

Left Wing

The airplane's left wing was found broken aft and cut at the root during recovery. The wing was broken into two pieces at mid span. Both sections were crushed aft and bent upward from the leading edge aft to the rear spar. The fuel bladder was broken open. No fuel was present. The wing tip was broken aft longitudinally and separated.

The left aileron push-pull tubes, linkages and cables were observed. The cables into the wing were cut at the root during recovery. The left aileron was broken and separated from the wing. It was bent upward and buckled aft. The actuator to the surface was manipulated and moved by the bellcrank. The aileron cables were traced to the bellcrank at the wing separation.

The cables were traced into the cockpit to the control yoke. The control yoke was broken.

The left flap remained connected to the wing. It was in the up position and was bent and buckled. The left main landing gear was in the up position.



Figure 2. Left Wing

Right Wing

The airplane's right wing had been cut at the root during recovery. The wing was crushed aft along the leading edge to the forward spar, from the wing tip to the root. The wing tip was broken aft longitudinally and partially separated. The fuel bladder was broken open. No fuel was present.

The right aileron bellcrank, cables and linkages were located. The aileron cables into the wing were cut during recovery. Manipulation of the aileron cables moved the aileron, which was attached to the wing. The aileron was bent and buckled. The aileron cables were intact from the cockpit area to the control yoke.

The right flap was connected, bent, buckled, and in an upward position. The right main landing gear was in the up position.



Figure 3. Right Wing

Cockpit, Cabin Area, and Fuselage

The cockpit and cabin area were broken open and crushed upward. The seats had been removed during recovery prior to the examination. The instrument panel was crushed forward and fragmented. The firewall was bent and crushed upward and forward around the engine accessories. The landing gear gearbox was observed and indicated the gear was in the up/retracted position. The throttle, propeller, and mixture knobs were observed and were fully in. The fuel selector was not located.



Figure 4. Throttle, Propeller and Mixture Controls



Figure 5. Landing Gear Gearbox

The baggage compartment was broken open. The fuselage aft of the baggage compartment was bent and buckled at the baggage compartment and intact aft to the empennage.

Flight control cables from the cockpit to the elevators and rudders were intact through to the control surfaces' actuators.



Figure 6. Control Cables to the Elevator and Rudders

Empennage

The empennage components, the left and right V-tail stabilizers, the elevators, and rudders were all intact and showed little damage. The right stabilizer and the left and right elevators and rudders had been removed during recovery. The left stabilizer remained with the fuselage. The cable linkages to the control surfaces had been removed but were all intact. The tailcone was intact and showed little damage.



Figure 7. Left V-tail Stabilizer



Figure 8. Left Elevator and Rudder and Tailcone



Figure 9. Right V-tail Stabilizer



Figure 10. Right Elevator and Rudder

Airframe Summary

Flight control continuity was confirmed from the cockpit to all flight control surfaces. All structural damage to the airplane was consistent with ground impact. No pre-impact anomalies were found with the structure and flight controls.

F. SUMMARY OF ENGINE EXAMINATION

Continental IO-520-A3 [s/n 8142534R]

The engine was lifted with the front of the airframe. The fuselage and cowling beneath the engine were crushed upward. The nose landing gear was observed in the up position and the gear door was crushed upward against the bottom of the engine. The exhaust manifold and mufflers were crushed upward against the bottom of the engine. The oil sump was broken open and fragmented. The exterior of the engine was photographed. The remaining firewall and instrument panel were bent aft and removed from the engine. The two magnetos were broken out of the accessory case at the top of the engine and found resting on top of the engine. The magnetos as well as the oil filter, and fuel distribution manifold were removed.



Figure 11. Engine Data Plate

The wiring harness was cut and removed from the top six spark plugs. The top spark plugs were removed and examined. They electrodes showed minimal wear and were light gray with no combustion deposits.

The front of the engine case was broken aft and fragmented, exposing the crankshaft, camshaft, and the journals and piston rods to the number 5 and number 6 cylinders All of the

cylinder piston rods and journals, and all the pushrods to the rockers and the camshaft aft to the drive gear could be observed. The number 5 and 6 cylinders were still attached to the engine case but broken aft and downward. The front camshaft gear was bent and broken. The flange of the crankshaft had a portion of the propeller hub still mounted. The hub was broken in a torsional manner and rearward. Rotation scoring was observed on the hub remains and flange, consistent with rotation at impact.



Figure 12. Engine, Front Side, Crankshaft, Camshaft, Number 5 and 6 Cylinders



Figure 13. Flange and Remaining Propeller Hub

The rocker box covers were removed, and the rockers and the intake and exhaust valves on all six cylinders were observed. All were intact and showed little damage. The number 6-

cylinder head was broken at the intake valve and the pushrod was separated. The exhaust valve rod end was exposed.



Figure 14. Engine, Left Side, Valves, Springs, and Rockers

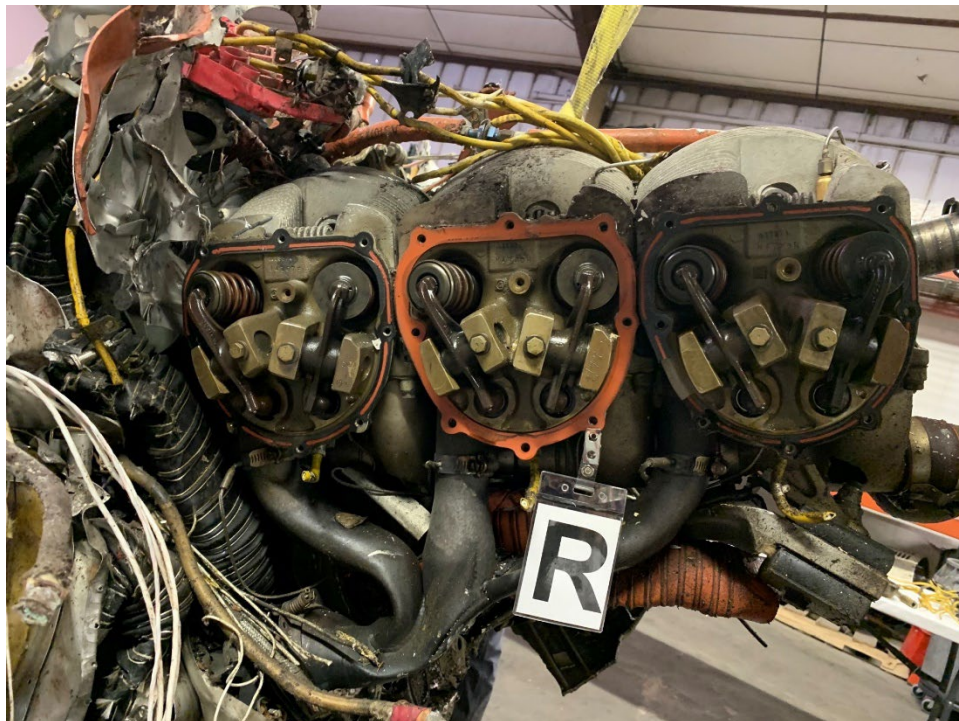


Figure 15. Engine, Right Side, Valves, Springs, and Rockers

Right Magneto, Model S6RN-1205 [Serial No. 11209710]

The right magneto was intact but sustained significant impact damage. The magneto was broken out of the engine accessory section at the impulse coupling. When rotated, the impulse coupling spun freely. The drive gear for the right magneto in the accessories section was intact.



Figure 16. Left Magneto, Top Spark Plugs & Fuel Injectors, Cylinders 1, 3 & 5 (Left to Right)

Left Magneto, Model S6RN-1205 [Did Not Observe]

The left magneto was also intact and had sustained significant impact damage. The magneto was broken out of the engine accessory section at the impulse coupling. When rotated, the impulse coupling spun freely. The drive gear in the accessories section to the left magneto was intact.



Figure 17. Right Magneto, Top Spark Plugs & Fuel Injectors, Cylinders 1, 3 & 5 (Left to Right)

Fuel Injectors

The fuel injectors were removed and examined. They were all intact and clean.

Fuel Distribution Manifold

The fuel distribution manifold was removed and opened. The fuel screen was removed and examined. The screen was clean and showed no debris. No debris was observed in the manifold housing.



Figure 18. Disassembled Fuel Distribution Manifold

Throttle Body Housing

The throttle body housing was observed beneath the engine. It had been crushed upward but was intact. The fuel screen was removed and examined. The screen was clean and showed no debris.



Figure 19. Throttle Body Housing

Oil Filter

The oil filter was broken from its housing and rested between the engine accessories case and the firewall. It was removed and observed. The filter was crushed slightly. Oil observed exiting the filter was clean and showed no debris. Information written on the filter showed it had been installed on July 28, 2020, and the tach time at installation was 5,386.31 hours.



Figure 20. Oil Filter

Vacuum Pump

The vacuum pump was separated from its housing and rested between the engine accessories case and the firewall. The pump could not be removed, but it was turned enough to see that the pump was intact and the drive gear into the pump was also intact.

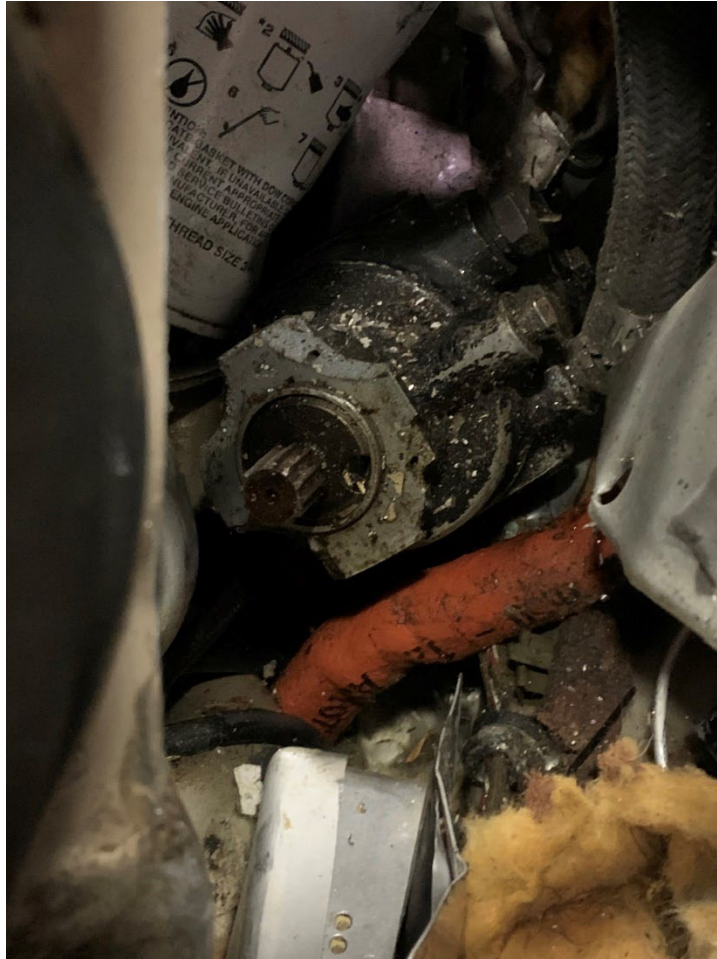


Figure 21. Vacuum Pump

Engine Examination Summary

Engine continuity was confirmed. Torsional break of the propeller flange was consistent with rotation at impact. All physical damage to the engine was consistent with ground impact. No pre-impact anomalies were found.

G. SUMMARY OF PROPELLER BLADES EXAMINATION

Propeller [Make, Model, and Serial Number Not Determined]

Two of the three propeller blades were present for examination. According to the Beegles mechanic who assisted with the disassembly of the engine and who also recovered the wreckage

from the accident scene, informed that the third blade was not recovered. The unrecovered third blade's hub attachment was present and showed severe impact damage, with no evidence of a pre-impact failure.

The first propeller blade was broken out at the hub and the base of the blade was crushed and broken. The blade displayed S-bending and chordwise scratches. There were nicks and gouges in the leading and trailing edges, and a four-inch piece of the tip trailing edge was broken out.



Figure 22. Propeller Blade 1

The second propeller blade was also broken out at the hub and the base of the blade was crushed inward. The blade also displayed S-bending and chordwise scratches, and there were large nicks and gouges in the leading and trailing edges of the blade.



Figure 23. Propeller Blade 2

Propeller Examination Summary

All physical damage to the two recovered propeller blades were consistent rotation at ground impact. The third unrecovered blade's hub attachment was consistent with impact damage and the hub showed no evidence of a pre-impact failure.

H. ADDITIONAL INFORMATION

Two plastic boxes of personal effects to include in the first box, a bag containing an airplane cover, and pieces of a sign. In the second box, there was a headphone case, a first aid kit, a gym bag that contained tools, clothes, and tie-down straps, a flashlight and a broach, a torn and empty United Airlines rucksack bag, a torn backpack that contained empty water bottles, that had broken pieces of a camera (GoPro-type) or GPS mount, and a small purse. The purse contained a small amount of money, 10 plastic cards (debit and gift cards) from several companies, and the airplane's key.

All these items remained with the airplane wreckage. No components were retained from this examination.