

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN22LA330

EXAMINATION SUMMARY

November 10, 2022

A. ACCIDENT

Location: Wardsville, Missouri
Date: July 20, 2022
Time: 1845 Central Daylight Time
Airplane: Beech N35 (s/n D-6688) / N1228Z

B. EXAMINATION SUMMARY

Investigator-In-Charge	Timothy Sorensen National Transportation Safety Board Denver, Colorado
Party Representative	J. D. Kuti Pinnacle Aircraft Engines Silverhill, Alabama
Party Representative	Bill Ross Superior Air Parts Coppell, Texas

C. SUMMARY

On July 20, 2022, about 1845 central daylight time, a Beech N35 airplane, N1228Z, was substantially damaged when it was involved in an accident near Wardsville, Missouri. The pilot was not injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

D. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

Beech N35 (s/n D-6688)

The forward and mid sections of the fuselage were damaged. Specifically, the keel structure common to the engine mounts and nose landing gear was deformed downward. The center fuselage exhibited localized buckling damage. Both were consistent with the forced landing. The wings and left ruddervator were removed to facilitate recovery and were not examined.

At the time of the examination, the cockpit engine controls (throttle, mixture, and propeller) were full forward. Engine control continuity was confirmed. The fuel selector was positioned to the left tank. It was not examined further.

2.0 Engine Examination

Continental IO-470-N (s/n 096829-R)

The engine exhibited an approximate 3" x 3" hole in the top of the crankcase above the #4 cylinder. Each cylinder remained securely attached to the crankcase. Each crankcase through-bolt was intact. The #3, #5, and #6 cylinders were removed normally. The cylinder valves, springs, push rods, and rocker arms appeared intact. The pistons and piston pins were unremarkable. The cylinders and pistons exhibited normal combustion signatures.

The #1, #2, and #4 cylinders exhibited mechanical damage consistent with connecting rod separations. The valve stems, springs, and push rods appeared intact. The pistons were retained in the cylinders due to the damage. The valve and piston faces were not examined. The lower surfaces of the pistons were not compromised, and no obvious anomalies were observed with exception of minor mechanical damage.

The inner surface of the crankcase exhibited mechanical damage consistent with connecting rod failures. The #1 and #4 cylinder skirts displayed mechanical damage. The crankcase journal bearings were in place.

The #1 connecting rod cap was separated, and the connecting rod bolts were fractured. The upper bolt halves were retained by the connecting rod. The lower bolt halves were retained by the cap. Both the connecting rod and the rod cap were deformed consistent with secondary mechanical damage. The #4 connecting rod was separated near the base. The rod cap was fragmented, and the connecting rod bolts were fractured.

The #5 connecting rod remained attached to the crankshaft; however, the rod, cap, bolts, and bearings displayed discoloration consistent with heat stress due to a lack of oil lubrication. The bearings exhibited corresponding wear and extrusion of the bearing material.

The remaining connecting rods were intact and secured to the crankshaft.

The crankshaft was intact. However, the #1 and #5 connecting rod journals exhibited discoloration consistent with heat stress due to a lack of oil lubrication. The #4 connecting rod journal displayed mechanical damage consistent with the connecting rod failure. The counterweights remained attached and exhibited some mechanical damage. The cam shaft was intact.

An oil filter adapter was installed, and the oil filter was secure. A safety wire was installed from the oil pump housing to the adapter. The oil filter was also safety

wired to the adapter. At the time of the examination, the oil filter adapter was loose on the oil pump housing. The adapter with the safety wire as installed was free to rotate about 40° with finger-tip pressure. Disassembly of the adapter was accomplished with hand pressure; a wrench was not required. Two cooper washers were installed at each end of the adapter cylinder. The adapter cylinder and insert appeared intact and undamaged. The insert threads appeared undamaged. No debris was observed within the adapter.

The oil pump housing was intact. The oil pump impellers appeared undamaged. The housing threads common to the oil filter adapter appeared intact and undamaged with exception of an approximate 0.100" portion of one thread which was missing. Otherwise, the threads were smooth and uniform. The filter adapter threads interfaced smoothly with the mating threads of the oil pump housing. No obvious anomalies with respect to the mating of the adapter to the housing were observed.

The oil sump was securely installed and intact. Approximately one quart of oil was recovered from the oil sump. The sump also contained metallic debris consistent with the observed engine damage.

The oil filter was intact and securely installed to the adapter. The filter was cut open and the media removed. Metallic debris was observed within the filter media.

The magnetos and ignition harness were secure, and the input drive gears were intact. Both magnetos produced a spark at all terminals when rotated. The spark plugs were secure and intact. The spark plug electrodes exhibited normal combustion signatures, with exception of two plugs that contained some soot deposits.

The fuel manifold was secure and appeared undamaged. Throttle and mixture control continuity were confirmed. The manifold throttle and mixture control arms were free to rotate. The venturi was unobstructed and the butterfly valve intact. The fuel screen was secure and safety wired. The screen itself was intact and free of debris or sediment. A small amount of fluid was present in the manifold consistent in odor and appearance to aviation fuel. The engine fuel lines appeared secure.

The engine-driven fuel pump was secure and intact. The input drive spline and adapter were intact. The pump rotated under hand pressure and expelled a small amount of fluid consistent in odor and appearance to aviation fuel.

The starter and starter adapter were secure and appeared intact. The adapter drive spline and pulley were unremarkable. Internal continuity was confirmed. The alternator belt was properly installed and continuous. The alternator was securely installed and unremarkable.

The propeller governor was secure and intact. The input drive spline was undamaged. The control arm was free to rotate. The governor gasket was intact, and the screen was unobstructed.

The engine air intake and filter appeared intact. The air induction ducting was secure and appeared undamaged. The exhaust ducting was secure.

3.0 Propeller Examination

Hub: Hartzell BHC-L2YF-1BF (s/nEG57A)

Blades: F8468AR (s/n J02784 / J02785)

The propeller assembly was securely attached to the engine crankshaft propeller flange. Both propeller blades were retained by the hub. The hub was intact and appeared undamaged. The first blade was bent aft about 45° over the outboard one-half of the span. The second blade was bent aft about 75° over the outboard one-quarter of the span. Both blades exhibited leading abrasion and chordwise scuffing.

Submitted by:
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