



**NATIONAL TRANSPORTATION SAFETY BOARD**

**Office of Aviation Safety**

**Central Region**

**5/4/22**

**AIRFRAME AND ENGINE EXAMINATION**

**CEN22LA118**

## **A. EXAMINATION PARTICIPANTS:**

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National Transportation Safety Board

## **B. SUMMARY**

Examination of N201VZ was conducted by the NTSB on May 4, 2022, at Air Salvage of Dallas. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

## **C. DETAILS OF THE INVESTIGATION**

### **Airframe Examination**

Firewall, cockpit and instrument panel were crushed and distorted from impact. The panel was fractured into several pieces. The left control yoke was pulled rear and bent. The right control yoke was crushed down and forward.

Ignition switch – key remained interest and selected to LEFT. When moved by hand, the key turned as expected to each selection.

Control quadrant – Throttle lever about mid-range. Mixture & propeller levers near full forward.

Wings – Wings were cut near the roots for recovery and transport. Left wing sustained impact damage near the outboard end. Ring wing sustained impact damage to the leading edge in several areas, which were small dents and round impact marks.

Ailerons – control tubes were cut near the wing roots. Control tubes were continuous from the cuts to the control surfaces. Control linkage was continuous from the cuts to the control yoke.

Flaps – Flaps were removed for recovery. Minimal damage. Did not check for functionality.

Rudder – Rudder control tubes were continuous from the pedals to the end of the fuselage where the empennage connects; the connection had been disassembled for recovery. Rudder surface intact with no damage and moved through entire range of motion.

Elevator – control tubes were continuous from the yoke to the end of the fuselage where the empennage connects; the connection had been disassembled for recovery. Elevator surface intact with no damage and moved through entire range of motion.

There were no preimpact mechanical malfunction or anomalies with the airframe that would have precluded normal operation.

### **Engine Examination**

After photo documentation, the engine was separated from the firewall for the examination. No crankcase or cylinder damage. Minor impact damage to the outside and especially the rear and accessory section. Bottom of engine and oil sump intact with no significant damage. Engine mounts mostly impact fractured. Verified that all fuel/oil lines that remained connected were tight and secure. Unable to verify engine oil level as the dip stick orifice was impact fractured and the

dipstick was loose. Oil that came from inside the engine during the exam appeared new and clean. Air filter sustained some impact damage but still mounted and clear of contaminants. Exhaust tubes all intact and minimal impact damage. Exhaust header connected and filled with sand/dirt and grass.

Propeller – Minor bending and polishing on both blades. Many small leading edge and chordwise scratches consistent with impact with sand.

Starter – intact and undamaged. Starter gear covered in dirt/sand

Alternator – intact and undamaged. Drive belt still attached and in good condition

Fuel pump – damaged but still mounted. Screen clear of contaminants. No anomalies noted other than impact damage to the housing. Fuel lines intact and tight connections except the fuel vent line, which was impact separated at the fitting which coincided with the housing damage.

Oil filter – remained attached and crushed forward onto its mount and could not be rotated. No further exam since the oil from inside the engine appear clear with no contaminants. No markings on the outside from last install/change.

Propeller governor – intact, mounted, and undamaged. Near the mount area there was impact damage to the engine case. Controls remained connected and moved through full range of motion when actuated from the cockpit lever. Drive shaft rotated without issue.

Ignition harness – sustained some impact damage but were all continuous from mags to the plugs. Left mag – remained attached to its mounting pad and sustained some impact damage to the rear side and ignition harness. P-lead remained attached. Featured an impulse coupling. When the mag was removed and spun with a drill, it produced a spark at each ignition terminal.

Right mag – remained attached to its mounting pad and sustained impact damage to the rear side ignition harness. P-lead remained attached. No impulse coupling. When the mag was removed and spun with a drill, it did not produce a spark from any terminal. Mag was disassembled and found a burn mark on the capacitor, which explains why the unit would not spark when rotated. After this was found, rotated the shaft and observed a spark jump from the coil to a screwdriver.

Spark plugs – All four top electrodes were “Normal” per Champion Check-A-Plug chart. Bottom plugs not removed or examined.

Fuel injector servo – intact and undamaged. All fuel lines and controls attached. Controls remained connected and moved through full range of motion when actuated from the cockpit throttle and mixture levers. Throttle plate actuated stop to stop. Inlet screen clear of contaminants. There was fuel that smelled like 100LL and appear free of contaminants.

Fuel manifold – intact and undamaged. Diaphragm intact and good condition. No contaminants.

Fuel lines to the injectors was tight and undamaged. Fuel inlet line was tight and undamaged.

Fuel injectors – All tight and clear of contaminants.

Left the magnetos remained installed for crankshaft rotation. Rotated the crankshaft via the propeller with no binding or anomalies noted. Verified all pistons moved within the cylinders, accessory gears rotated, and rocker arms moved on all cylinders. Thumb compression and suction obtained for all cylinders. Due to the setup, was unable to rotate the propeller fast and consistent enough to obtain a spark from the ignition wires, but the impulse coupling was heard.

There were no preimpact mechanical malfunction or anomalies with the engine that would have precluded normal operation.