



**NATIONAL TRANSPORTATION SAFETY BOARD**

**Office of Aviation Safety**

**Central Region**

**December 12, 2016**

**AIRFRAME AND ENGINE EXAMINATION**

**CEN17FA053**

**(4 pages)**

## **A. EXAMINATION PARTICIPANTS:**

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## **B. SUMMARY**

Examination of the airframe and engine were conducted on scene on December 10, 2017. The examination continued on December 11, 2016 at the facilities of Poplar Grove Airmotive. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

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

### **1.0 Airframe Examination**

The airplane came to rest inverted on a magnetic heading of 15°. The wings and tail were folded up and over the cockpit and engine. The impact crater was under the engine which was partially buried in the frozen ground. Both wings remained attached to the carry through spar and fuselage. The top surface of the fuselage and both wings were crushed and flattened. The bottom surfaces of the wings sustained impact damage but did not display the flattening and crushing to the extent of the upper surfaces. The left-wing flap and aileron remained attached to the wing. The right-wing flap remained attached to the wing. The inboard section of the right aileron was attached to the wing with the outboard section pulled away from the hinge. The right-wing tip was crushed back to the aileron. Both the left and right-wing aileron balance weights were attached. The wings appeared to have been modified and strengthened in accordance with Special Airworthiness Information Bulletin CE-10-08.

The elevator and rudder remained attached to the empennage. The leading edge of the rudder was crushed aft and the top of the rudder was bent to the left. The top surfaces of the elevator and horizontal stabilizer were flattened similar to the wings.

Control cable continuity was established from the flight control surfaces to the cockpit controls.

Ignition Switch – Both- Separated from panel. Key broken off. Tumbler was free to rotate.  
Throttle – Separated from throttle quadrant. Extended ½ inch  
Mixture control - extended about 1 ¼ in and bent 60°

Seat belt shoulder harness remained attached to the belt. The inboard lap belts mounts were separated from the attached point.

ELT – ACK Model E-04 DOM 4-30-15 s/n 0129-5  
ELT was broken from impact damage. It remained in the mounting tray which was separated from the mount. The ELT coax cable was severed.

The fuel selector was in the off position. The detents were intact. Air was blown into the fuel lines and the internal position was confirmed to be off.

Propeller - Sensenich Wooden Blades W68ZK-57G

One 28-inch section of the wooden propeller blade was located near the wreckage. The remainder of the propeller blades was shattered and found near the engine area at the accident site. Pieces of wood were imbedded in the bolts which attached the propeller to the propeller flange.

## **2.0 Engine Examination**

Continental O-200-A82B s/n 256463

The engine remained attached to engine mounts and firewall. Various wires, cables and hoses remained attached to the engine.

The engine sustained impact damage to the cylinders, crankcase, exhaust, and accessories. The propeller hub remained attached to crankshaft flange which was bent aft into the crankcase. Preventing rotating the engine.

Numerous cracks in the crankcase. The major cracks were:  
Between No. 2 and No. 4 cylinders up toward backbone  
Between No. 1 and No. 3 near cylinder bases  
From No. 3 cylinder base up toward backbone

All accessories exhibited impact damage

The induction and exhaust tubes were crushed up against the bottom of the engine.

The oil sump remained attached to the engine. It was partially crushed and pushed rearward and upward. There was no indication of a lack of lubrication within the engine.

The cylinders remained attached to the engine. All the cylinders exhibited impact damage. The No. 4 cylinder was pushed upward but remained attached to the crankcase. No. 3 cylinder pushed rearward into the No. 1. All of the connecting rods were in place, with some being bent.

All cylinders were boroscoped and no anomalies were noted. Cylinders No. 2 and No. 4 were removed, and a visual inspection confirmed continuity inside the engine. All of the valves, valve springs, pistons, piston rods, connecting rods were intact.

Carburetor – Precision Airmotive MA-3SPA s/n 75C77714 p/n 10-4894-1

Carburetor was separated from the induction system at the mounting flange. The throttle and mixture levers were broken off. Accelerator pump was actuated by hand and fuel was ejected which smelled like 100LL fuel. The carburetor bowl was empty. The plastic floats and needle valve were intact. The fuel inlet line was broken at the fitting. The inlet screen was removed and free of debris.

The right magneto remained attached to the engine and exhibited severe impact damage. The magneto was in several pieces which precluded testing.

The left magneto was separated from its mount and remained attached by 2 of the ignition leads. The magneto drive would not rotate 360 degrees due to impact damage of the impulse coupling. The magneto was taken to a repair station and it was determined that the distributor gear was pushed away from the drive gear. When one of the distributor block screws was loosened the distributor block shifted back into position and reengaged with the drive gear. The magneto was placed on a test bench and it sparked on all terminals.

The top 4 spark plugs were removed. Denzo plugs. No anomalies were noted with the spark plugs which exhibited dark grey combustion deposits.

Both the starter and alternator sustained impact damage.

No vacuum pump installed.

Battery – Power Sonic Model PS-1280NB 12v 18 amp Sealed Lead Acid  
P.O. 840275 Lot 30-17834 p/n 11-03154 LOC 26ID

The battery was found at the accident site near the engine. The case of the battery was broken and some of the internal cells were found outside the case. The battery cells were burnt, but the case was not.

Submitted by: Pam Sullivan