

# National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23LA124

## **ENGINE EXAMINATION**

April 12, 2023

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## **A. ACCIDENT**

Location: Jacksonville, Florida  
Date: February 6, 2023  
Time: 1432 EST  
1932 UTC  
Airplane: N330PC; RV-6

## **B. ENGINE EXAMINATION**

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## **C. SUMMARY**

On February 6, 2023, about 1432 central standard time, an experimental amateur-built RV-6, N330PC, was substantially damaged when it was involved in an accident near Milton, Florida. The airline transport pilot sustained serious injuries. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

## **D. DETAILS OF THE EXAMINATION**

### **1.0 Engine Examination**

As first viewed, the engine was in a bag laying inverted on the floor at the facilities of Florida Air Recovery and remained partially attached to the firewall through the tubular mount. The engine was rolled upright and suspended from a lift. The crankshaft was separated about 1 inch aft of the propeller flange. The crankshaft flange remained attached to the propeller hub and the two were separated from the engine. The induction airbox and the engine exhaust tubing were impact damaged.

The crankcase was examined and had no holes. The cylinders were examined with a lighted borescope and no anomalies were noted. The crankshaft was rotated using a tool inserted in an accessory case drive pad. Crankshaft continuity was confirmed from the fracture at the crankshaft flange through the rear accessory gears. Compression and suction were confirmed on all cylinders when the crankshaft was

rotated through 720° of rotation. The rocker covers were removed, and valve train continuity was confirmed when the crankshaft was rotated through 720° of rotation.



**Photo 1: Engine as first viewed.**



**Photo 2: Impact separation of the crankshaft flange.**



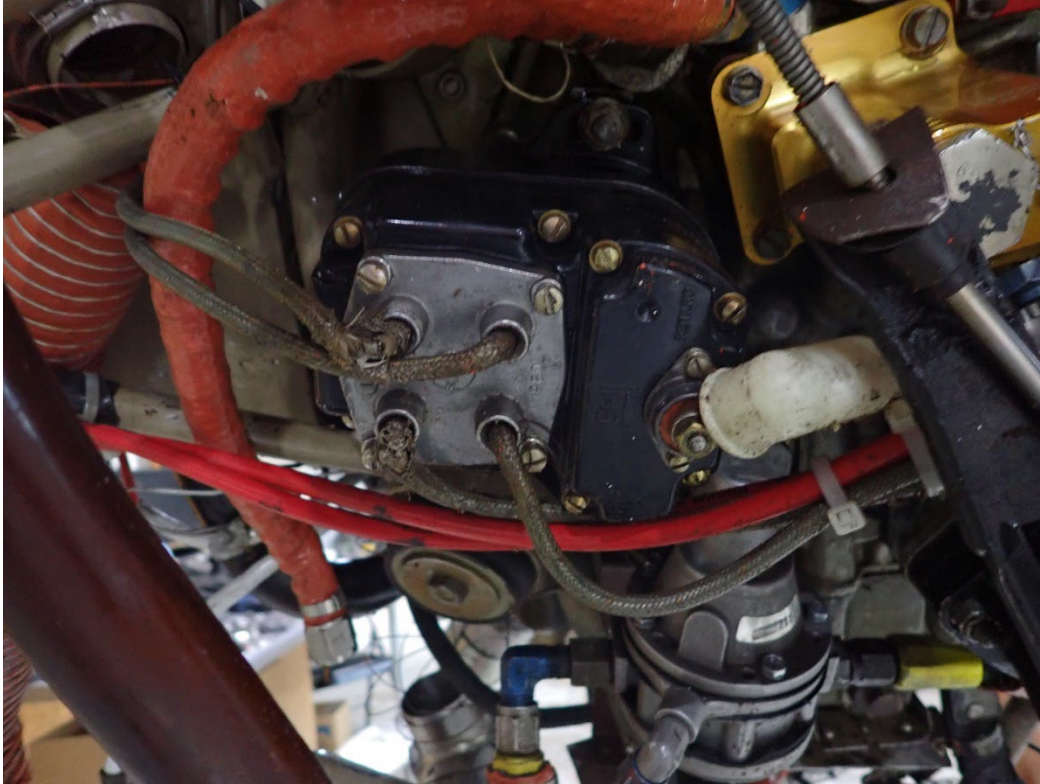
**Photo 3: View of engine from the front with heat shielding and rocker covers removed.**



**Photo 4: View of the engine from the rear with accessories removed.**

## **1.1 Magnetos**

The airplane was equipped with one standard magneto (left) and one electronic magneto (right) which remained attached to the accessory case and were removed for examination. The standard magneto sparked at all leads when rotated by hand. The electronic magneto sparked at all leads when connected to a power source and rotated by hand.



**Photo 5: View of the left standard magneto.**



**Photo 6: View of the left standard magneto removed for examination.**



**Photo 7: View of the electronic magneto removed for examination.**

## **1.2 Ignition System**

The starter motor was impact separated and fragmented. The top and bottom sparkplugs were removed for examination. All exhibited normal wear when compared to the Champion Aerospace Aviation Check-A-Plug chart. The electrodes of the Nos. 2 and 4 upper spark plugs were oily. The electrodes of the Nos. 2 and 4 lower spark plugs were oily. The No. 2 lower spark plug was impact damaged. The ignition harness was impact damaged.



**Photo 8: View of the starter motor hanging from the engine.**



**Photo 9: View of the top and bottom sparkplugs.**

### **1.3 Fuel System**

Fuel selector was found in the left position and no obstructions were noted from the selector to impact damage at the wing root when air was blown through the line.

The fuel strainer bowl was removed and examined with no anomalies noted, the fuel strainer screen was removed and exhibited minimal debris.

The fuel boost pump remained attached to the firewall and was removed for examination. Power was applied to the airframe fuel boost pump, and it produced air at the outlet port.

The engine driven fuel pump remained attached to the engine and no damage was noted. Air was produced from the outlet port when the pump was actuated by hand. The pump was partially disassembled and exhibited no damage to the rubber diaphragms or internal check valves.

The fuel injector servo remained attached to the engine and no damage was noted. The throttle control cable remained attached to the servo throttle control arm and the arm remained attached to the servo. The mixture control cable remained attached to the servo mixture control arm. The mixture control cable was impact separated at the rod end and the rod end remained attached to the servo. The servo fuel regulator section was partially disassembled and no damage to the rubber diaphragms or other internal components observed. The servo fuel inlet screen was absent of debris.

The fuel flow divider remained attached to the engine and no damage was noted. It was partially disassembled, and the rubber diaphragm was observed intact.

The one-piece GamiJector fuel injector nozzles were unobstructed. The #2 nozzle was impact damaged.

Liquid with an odor consistent with aviation gasoline was observed in the engine driven fuel pump, fuel servo, the hose from the servo to the flow divider and in the flow divider.



**Photo 10: Fuel selector as first seen at the recovery facility.**



**Photo 11: View of the fuel strainer screen.**



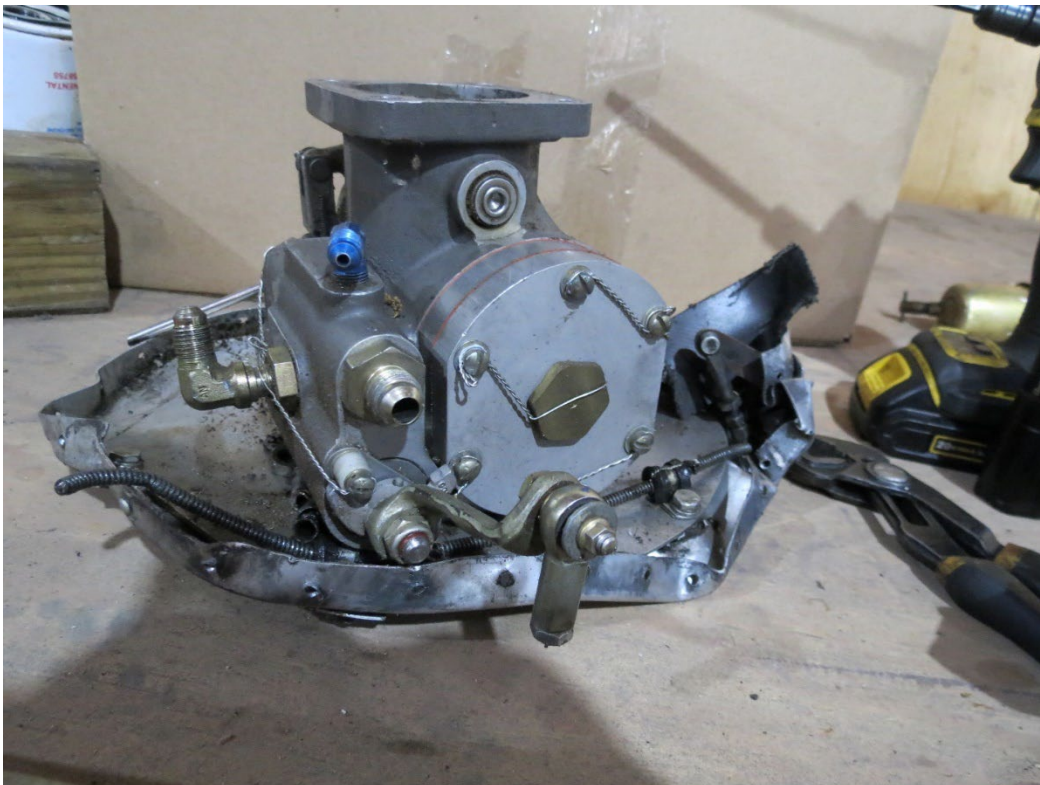
**Photo 12: View of the fuel boost pump removed for examination.**



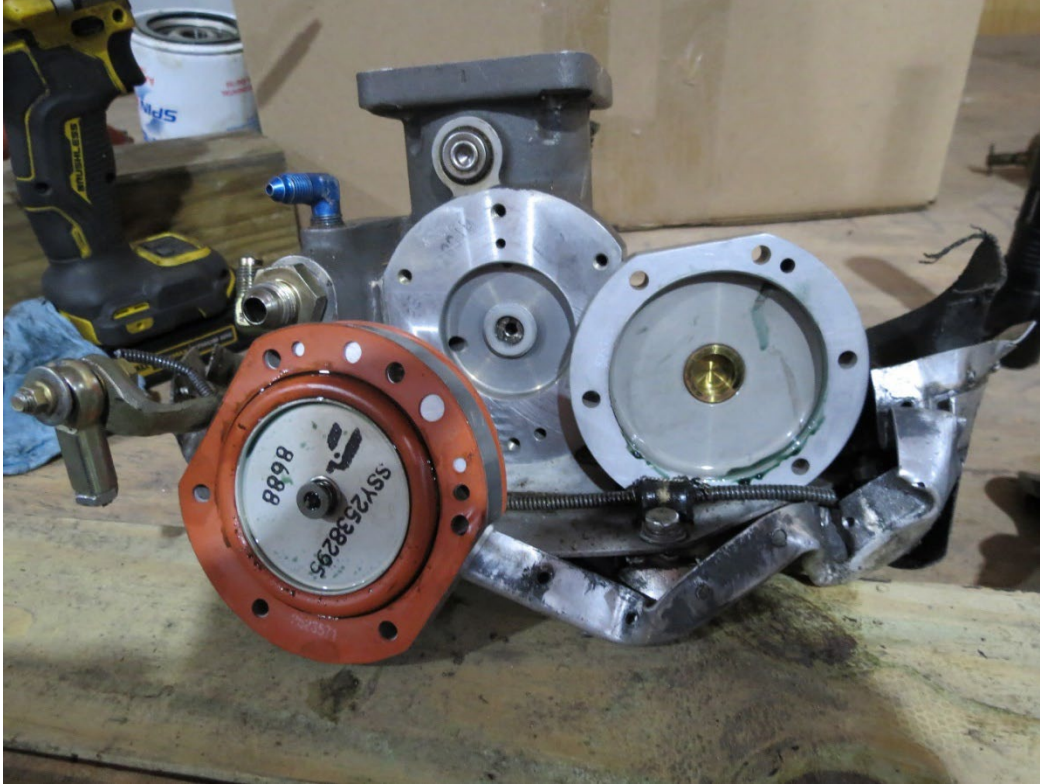
**Photo 13: View of the engine driven fuel pump disassembled for examination.**



**Photo 14: View of the fuel injector servo removed for examination.**



**Photo 15: View of the fuel injector servo removed for examination.**



**Photo 16: View of the fuel injector servo partially disassembled for examination.**



**Photo 17: View of the servo fuel inlet screen.**



**Photo 18: View of the fuel flow divider attached to the engine.**



**Photo 19: View of the fuel flow divider disassembled for examination.**



**Photo 20: View of all four fuel injector nozzles.**

#### **1.4 Lubrication System**

Oil was observed in the engine. The oil sump remained attached to the crankcase and was not damaged. The oil suction screen was removed and examined with no debris noted. The oil filter remained attached to its mount and was removed for examination. The filter was removed, cut open, and the pleats were examined with no debris noted.



**Photo 21: View of the oil pan from the bottom with the fuel injector servo removed.**



**Photo 22: View of the oil suction screen removed for examination.**



**Photo 23: View of the oil filter attached to its mount.**

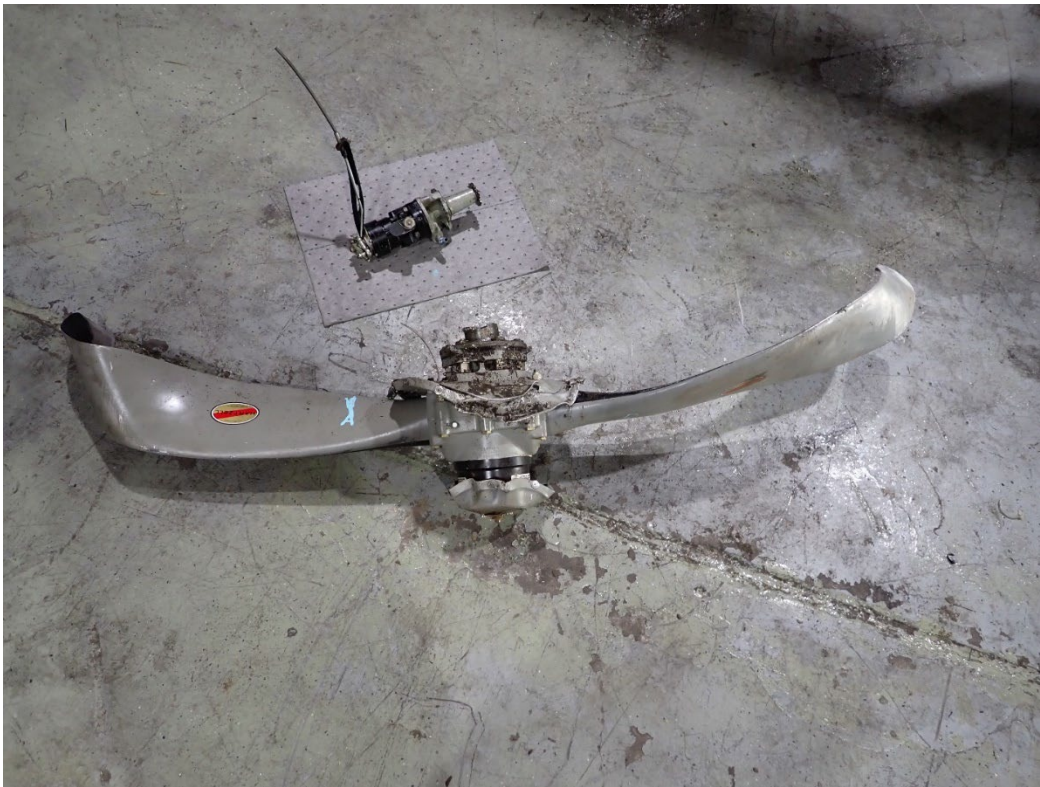


**Photo 24: View of the oil filter pleats.**

## 2.0 Propeller Examination

The propeller and crankshaft propeller flange were impact separated from the engine. The propeller spinner was separated from the propeller. The propeller blade marked "A" was rotated about 90 degrees in the hub such that the leading edge faced forward and was curled aft beginning about 1 foot from the tip. That blade also exhibited trailing edge "S" bending, spanwise twisting, chord-wise abrasion and leading-edge gouges. The blade marked "B" was curled aft beginning about 8 inches from the tip and exhibited spanwise twisting, chord-wise abrasion and leading-edge gouges.

The propeller governor remained attached to the engine and no damage was noted. The propeller control cable was fractured at the rod end near the governor. The rod end remained attached to the governor control arm and the arm remained attached to the governor. The governor drive assembly was rotated freely by hand. The governor oil screen was absent of debris.



**Photo 25: Overview of the propeller.**



**Photo 26: View of the crankshaft flange which remained attached to the propeller hub.**



**Photo 27: Camber side of propeller blade A.**



**Photo 28: S-bending of propeller blade A.**



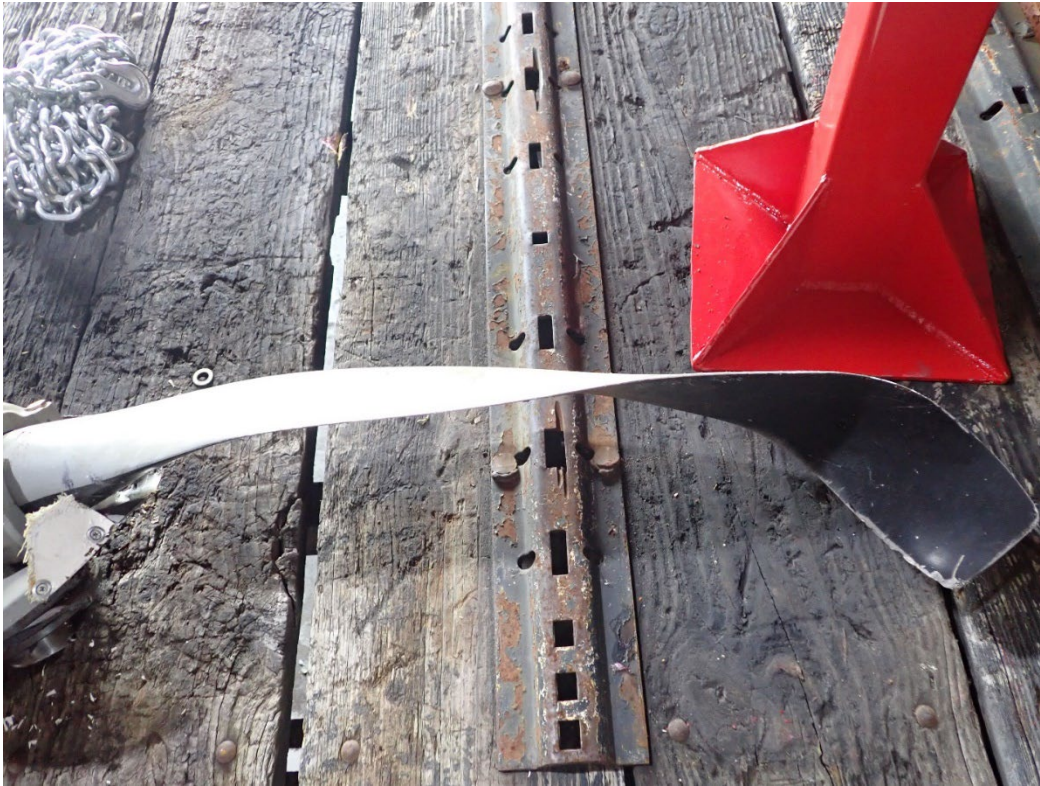
**Photo 29: Polishing and leading-edge gouging of propeller blade A.**



**Photo 30: View of the camber side of propeller blade B.**



**Photo 31: Chordwise scratching and polishing of propeller blade B.**



**Photo 32: Trailing edge of propeller blade B.**



**Photo 33: Overview of the propeller governor partially disassembled for examination.**



**Photo 34: Propeller governor oil screen.**

Submitted by:

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