

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23FA314

LEFT ENGINE EXAMINATION SUMMARY

April 16, 2024

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A. ACCIDENT

Location: Kearney, Missouri
Date: July 20, 2023
Time: 0934 LCL
1434 UTC
Airplane: N200RA, Piper PA-31P, S/N 31P7400198

B. LEFT ENGINE EXAMINATION SUMMARY

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Investigator	Aaron Sauer NTSB Aurora, Colorado
Party Member	Troy Helgeson Lycoming Engines Williamsport, Pennsylvania
Party Member	Les Doud Hartzell Propeller Piqua, Ohio

C. SUMMARY

The examination was conducted with Lycoming and Hartzell at Dodson International in Rantoul, Kansas April 16, 2024. The examination consisted of both a visual and teardown inspection of the Lycoming TGIO-541-E1A engine along with the attached propeller. The examination revealed no mechanical failures or malfunctions that would have precluded normal operation.

D. DETAILS OF THE EXAMINATION

1.0 Engine Examination

The PA-31P was equipped with a 425 horsepower turbocharged geared Lycoming TIGO-541-E1A engine S/N RL-262-62. The engine was field overhauled on April 18, 1984. At the time of overhaul, the engine had 1141.8 hours since

remanufacture. The engine had accumulated 959.2 hours since major overhaul as of June 28, 2023 which was documented in an Ferry Permit Airframe Logbook entry 22 days prior to the accident flight. The airplane had sat unused according to witnesses for a number of years. Maintenance entries show that the airplane cumulated 10.2 hours from July 18, 2007 to June 28, 2023.

The engine was located in an open-air pole barn from the accident date until a week prior to the engine exam at Dodson. The engine was observed to be undisturbed before the visual examination of the engine.

Visual examination of the engine prior to teardown showed post-impact fire damage to the entire engine with majority of the damage occurring along the accessory section. Numerous hoses and wiring had post-impact fire damage to both the fire sleeves and inner hoses or wiring. Various components along the bottom and rear of the engine had crush damage consistent with impact. The turbocharger was still attached with relatively little fire damage. The gear reduction box was fractured and missing the upper section of the engine case. The propeller with the gears were separated from the engine.

Oil dipstick was removed, and oil level of about one inch from the bottom of the dipstick was observed. Oil filter installation writing was unable to be found due to fire damage. The filter was removed and examined with no metal observed in the media. The oil and filter media had a mostly black appearance and turned to ash when touched.

Spark plugs were removed and observed to be all black in appearance.



Figure 3. Spark Plugs

All six cylinders were borescope with no abnormalities observed.

The intake tubes were removed and the fuel injectors inside the manifold housing were examined. The intake manifold housing was clean and the fuel injectors were examined for blockages and general condition. The fuel injectors passage was examined by holding the injector to a flashlight. All fuel injectors had no abnormalities observed.

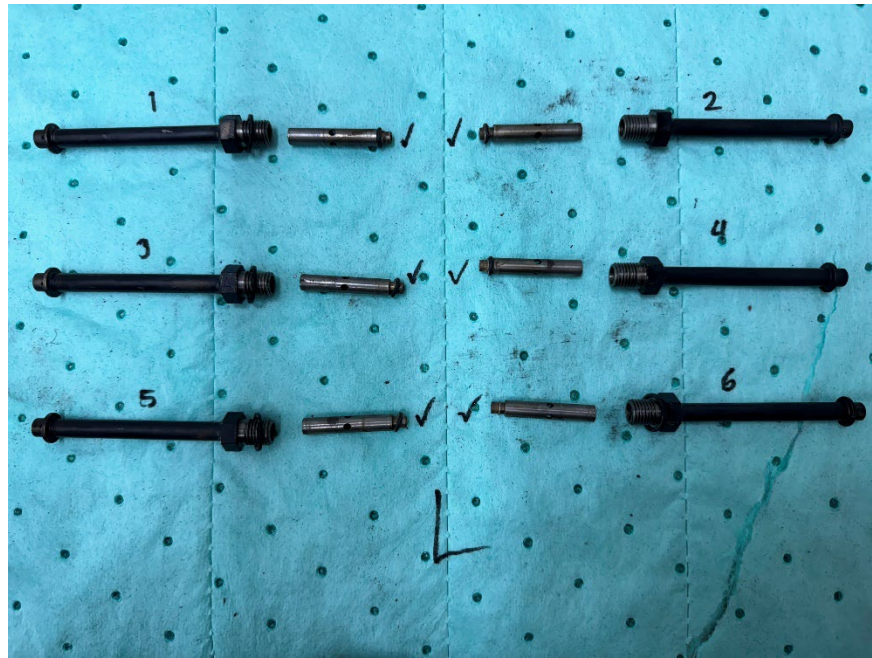


Figure 4. Fuel Injectors as removed from the manifold.

The engine was unable to be rotated by hand with the propeller and engine continuity to the accessory section unable to be confirmed due to impact and thermal damage.



Figure 5. Turbocharger Compressor

The turbocharger, waste gate, and waste gate controller were removed and teardown inspection was performed. The waste gate controller had sooting on the exterior surface from the post-impact fire. The waste gate was in the fully closed position with external damage to the linkage arm. The waste gate moved freely through the entire range when actuated by hand. The waste gate controller housing was removed, and the piston was found seized in the fully open position. Black tar and ash like debris were found within the housing between the piston and spring. The piston was successfully removed by turning the adjustment screw to the fully closed position. Black tar and cinder like debris were found between the piston head and oil inlet orifice.



Figure 6. Compressor housing with rotational witness marks

The turbocharger was visually inspected and the turbocharger had continuity between the compressor and exhaust section. The turbocharger rotated with resistance when turned by hand with a metallic grinding sound present. A teardown of the assembly was performed to inspect for rotational witness marks. The compressor housing showed rotational witness marks and compressor burring and bending of the blades.

2.0 Propeller Examination

The propeller was still attached to the gear reduction gears but separated from the engine with all three blades loose in hub. Each propeller blade could be rotated through its respective pitch range by hand. Cylinder was impact separated from the hub and a dent in the cylinder precluded removal of the piston and feathering spring. The low pitch stop had an impact mark indicating the propeller was operating in the low pitch range and not feathered. Blade L1 was twisted towards low pitch and Blade L2 and L3 were bent aft in opposite rotation. Blade L1 had cable strike gouge in the leading edge and blade face. Blade L2 had five inches of the blade tip separated and not recovered.

Submitted by:

Andrew Finne

Air Safety Investigator