

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR25LA039

ENGINE AND AIRFRAME EXAM SUMMARY

January 7, 2025

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A. ACCIDENT

Location: Pomona, CA
Date: November 17, 2024
Time: 11:11 Pacific standard time
Airplane: N617ET, Piper PA-32-300

B. ENGINE AND AIRFRAME EXAM SUMMARY

NTSB-IIC Kristyn Blocher
National Transportation Safety Board
Federal Way, Washington

Party Coordinator Mark Platt
Lycoming Engines
Phoenix, Arizona

Party Coordinator Sean Holloway
Piper Aircraft
Weatherford, Texas

C. SUMMARY

Examination of the engine and airframe was conducted at the facilities of South-West Aircraft Recovery, on January 7, 2025. A panel mounted JPI unit, and the fuel injection servo were retained for further examination.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe examination

Tach: 1546.6
Hobbs: 2104.9
Throttle: FULL
Mixture: absent/unreliable
Propeller: unreliable
Magnetos: OFF
Fuel Selector Handle: unreliable
Fuel Selector Valve Assembly: Left Main
Master: OFF

The airframe cabin displayed crushing and denting throughout, consistent with impact damage, as well as areas of the frame that were cut or displaced during emergent first response. (See figure 1.) The seat tracks remained attached to the floor structure. The row 1, left seat frame was securely attached to the seat tracks at two of its four rollers. The forward two rollers were detached from the seat tracks; the rear two rollers were secure in the seat tracks. The row 1, right seat frame was securely attached to the seat tracks at each of its rollers. The row 3, right and left seat frames were both secure and attached.



Figure 1. View of cabin. (Courtesy of Piper Aircraft)

The row 1, left seat had a lap belt and a shoulder harness installed. The inboard lap belt bracket was observed detached from the fuselage due to sheared attaching rivets. The row 1, right seat had a lap belt and shoulder harness installed; it remained securely installed. The row 3, left seat had a lap belt installed; it remained securely installed. The row 3, right seat had a lap belt installed. It remained securely installed. The installation of the outboard half of the lap belt was installed in a manner that required a twist in the belt, to facilitate a secure latch in the buckle. (Pilot stated the occupants were seated in rows 1 and 3.)

The wings were removed from the fuselage by wreckage recovery personnel. The left wing was removed about 2 ft from the wing root, and displayed leading edge denting and gouging, and was buckled midspan. The left aileron remained attached at its attach points. The left flap was separated from the wing. The left main fuel cap was not in place and was located inside the cabin. The left wing tip fuel cap was

found to be in place and secure. (See figure 2.) The right wing displayed leading edge denting and gouging. The right aileron and flap remained attached at their attach points. The right wing main fuel cap was found to be in place and secure. The right wing tip fuel cap assembly was found to contain areas of fracture separation and denting/distortion and was in place, partially secured. (See figure 3.)



Figure 2. Left wing.



Figure 3. Right wing.

The fuselage displayed areas of denting and buckling throughout, consistent with impact damage. (See figure 4.) The upper forward cockpit, and right side of the instrument panel displayed crush damage and were separated, consistent with impact damage.



Figure 4. View of fuselage. (Courtesy of Piper Aircraft)

The right control yoke was separated at the forward end of the tube, and the tee bar was separated at the vertical/horizontal connection point. The aileron control chain was broken at a link, left of the control column. The rudder bar displayed dents and bends throughout the length of the bar, consistent with impact damage. Flight control continuity was established to the ailerons, stabilator, and rudder.

The main landing gear and nosewheel landing gear were observed separated from the fuselage and wings.

The stabilator was removed from the empennage by wreckage recovery personnel. The left side of the stabilator displayed denting and buckling along the leading edge, and accordion crushing, aft. The right side of the stabilator displayed denting, mid span. The vertical stabilizer remained attached to the empennage and was unremarkable. The rudder remained attached to the vertical stabilizer and displayed denting in its lower half. The pitch trim actuator was observed with 5 threads and 0.8 inches exposed at the top of the actuator, which correlates to an approximate neutral pitch trim setting.

This airplane was equipped with two main fuel tanks and two wing tip fuel tanks. All four fuel tanks were observed breached. Low pressure air was applied to all fuel lines, vent lines, and finger screens, and no blockages were observed.

Fuel selector valve continuity was established to the selector handle in the forward cabin. Fuel selector valve detent function was confirmed, and valve function was confirmed via air applied to each fuel line selected, individually. The absence of air flow to individual deselected fuel lines was also confirmed.

The electric driven fuel pump contained a small amount of liquid, blue in color, consistent with 100LL aviation fuel. The electric driven fuel pump was energized, and an audible pump sound could be heard. The pump was disassembled, and the actuation of the vanes were visually confirmed by manually rotating the pump shaft. (See figure 5.) The motor was again energized and rotation visually confirmed.



Figure 5. Electric driven fuel pump.

About 4 oz of fuel was recovered from the fuel selector filter bowl, with the quick drain handle. A small amount of fuel had leaked and was not recovered. The recovered fuel was clean, clear, and blue in color. Water detecting paste confirmed that there was no water present in the fuel. (See figure 6.)

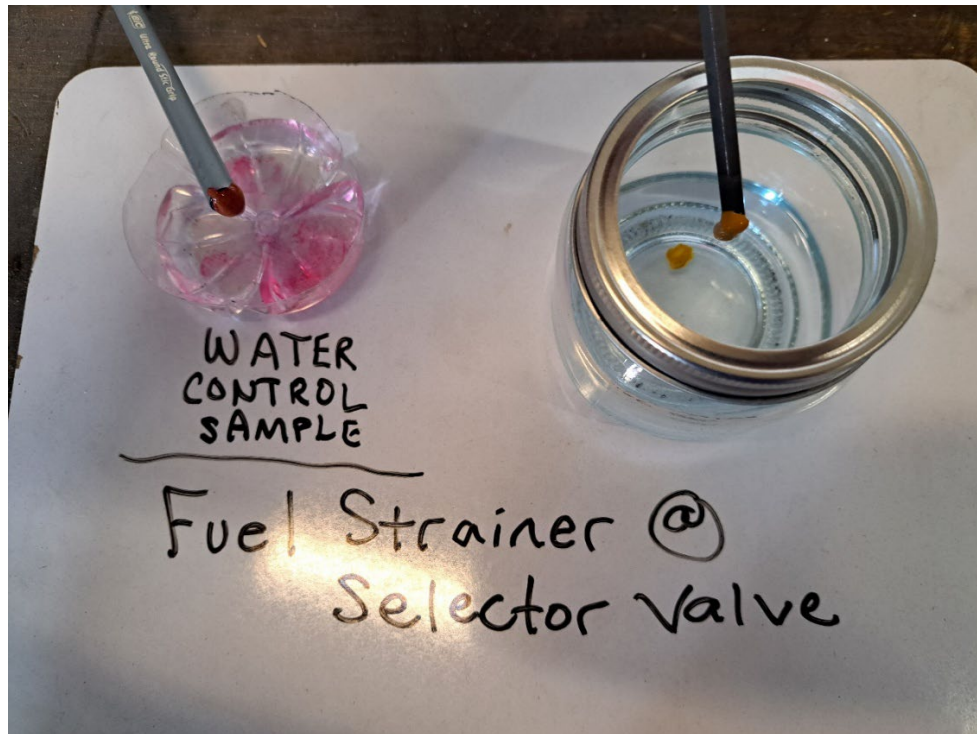


Figure 6. Fuel sample with water detecting paste. (Courtesy of Piper Aircraft)

2.0 Engine Examination

Engine Manufacturer: Lycoming Engines
Engine Model Number: IO-540-K1A5
Engine Serial Number: L-4833-48

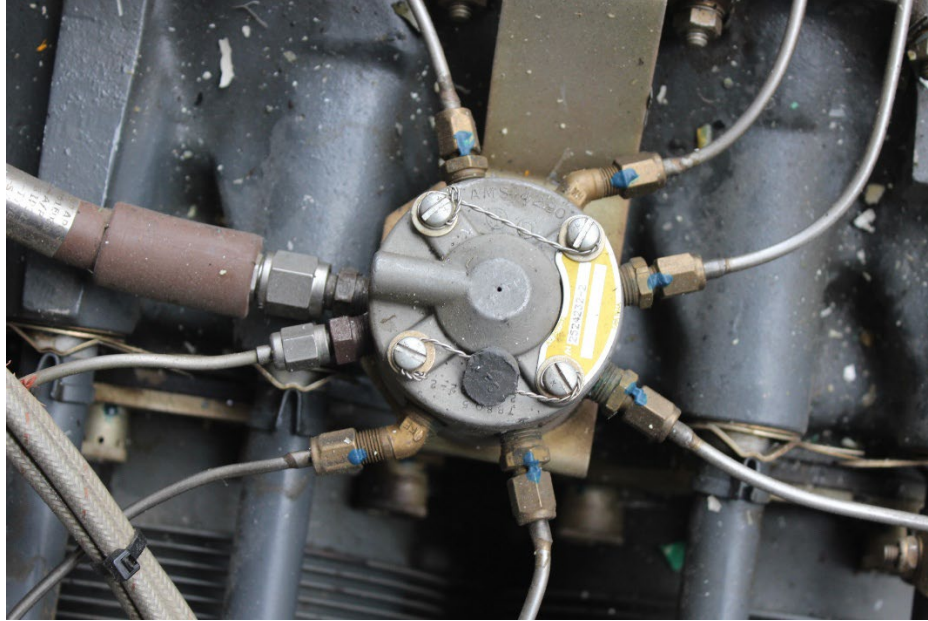
The engine was observed separated from the fuselage and remained attached to the engine mount. The engine mount displayed multiple areas of fracture and buckling, consistent with impact damage. (See figure 7.)



Figure 7. View of engine.

The propeller governor remained attached at its mounting pad. The propeller governor pitch control rod remained attached at the control arm.

The fuel flow divider remained intact and secure at the mounting bracket. The fuel lines remained secure at each fitting and fuel injector at each cylinder. (See figure 8.) The flow divider was disassembled and observed to be unremarkable and free of obstruction. The diaphragm was observed intact and unremarkable. The fuel injection nozzles remained secure at each cylinder with the respective fuel line attached.



See figure 8. Fuel flow divider. (Courtesy of Lycoming Engines)

The fuel injection servo remained securely attached at the mounting pad; continuity of the throttle and mixture controls was confirmed and they remained attached at their control arms. The plug on the side of the injector body remained secure, with safety wire in place. The servo fuel inlet screen was not removed; the fuel injection servo was retained for further examination and flow testing.

The fuel injection servo and induction system were observed to be free of obstruction. The foam filter element remained secure to the airbox bracket. The filter element remained intact and exhibited no evidence of preaccident obstruction to airflow.

The engine driven fuel pump remained attached at its mounting pad. The fuel lines remained secure at their fittings. The fuel pump was removed; the drive remained intact, and the drive splines displayed a wear pattern consistent with normal wear. (See figure 9.) The fuel pump was tested and delivered a steady state stream of fuel.

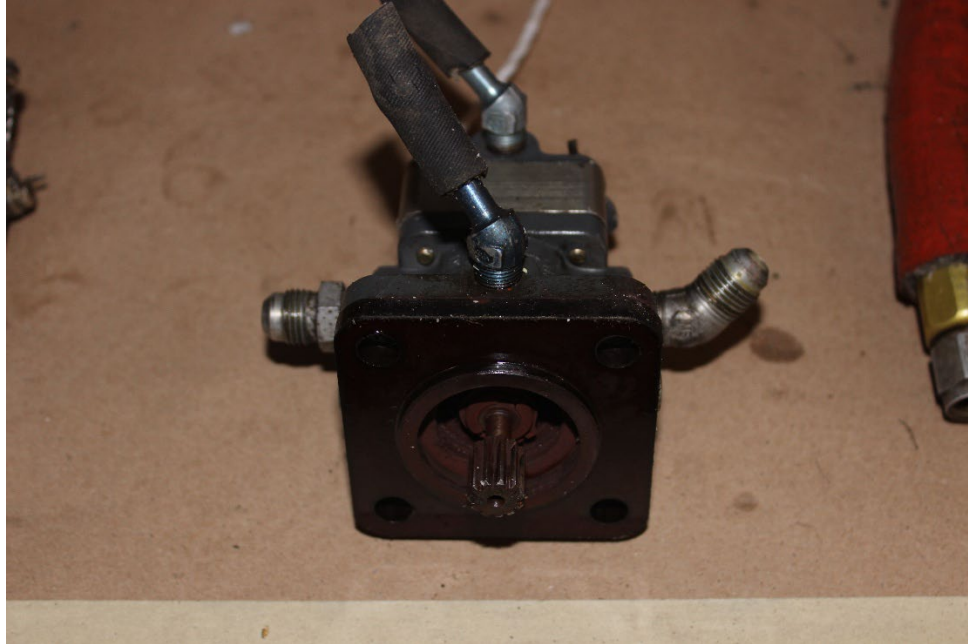


Figure 9. Engine driven fuel pump.

The engine driven fuel pump output line to the input line of the fuel injection servo, which also incorporated a fuel flow transducer, remained intact and securely attached at each fitting. The fuel line from the fuel injection servo to the fuel flow divider remained intact and secure at each fitting. None of these fuel lines, the fuel injection servo, or the fuel flow divider contained fuel. There were no breaches to any fuel system component found, forward of the firewall.

The left and right magnetos remained secure at their respective mounting pads. The magneto to engine timing was noted to be $\sim 20^\circ$ (right) and $\sim 20^\circ$ BTDC of the #1 cylinder (left). Both magnetos produced spark at all spark plug leads during hand rotation of their respective drive. The impulse coupler drive was found to be intact and safety wired.

The ignition harness was observed attached to each magneto and spark plug, and unremarkable. The upper spark plugs were removed observed to display coloration consistent with normal operation, according to the Champion Spark Plugs "Check-A-Plug" chart AV-27. The #2 spark plug was oil soaked, consistent with post-accident engine positioning. (See figure 10.)



Figure 10. Upper spark plugs.

The oil filter was observed secure at its mounting pad. The oil suction screen was found to be secure and contained no preaccident debris.

The cylinder valve covers were removed; no anomalies were noted with the rocker assemblies. The crankshaft was rotated by hand utilizing the propeller. Mechanical continuity was established throughout the rotating/reciprocating group, valve train and accessory section during hand rotation of the crankshaft. Thumb compression was obtained on all cylinders. Each cylinder was examined with a borescope; the combustion chamber deposits were consistent with normal operation. No anomalies were noted with intake or exhaust valves.

3.0 Propeller

Manufacturer: Hartzell
Model Number: HC-C3YR-1RF
Serial Number: DY6273B

The airplane was equipped with a three bladed, constant speed propeller. Each propeller blade remained attached to the hub and the propeller assembly remained attached to drivetrain. (See figure 11.)

Blade A displayed chordwise scratching along its leading and trailing edges, near the blade tip, and slight aft bending, about mid span. (See figure 12.) Blade B displayed multi directional scratches and gouging, and was bent aft, at mid span. (See figure 13.) Blade C displayed spanwise scratches and gouging throughout the outer two

thirds of the blade and along leading and trailing edges. It displayed s bending - bent aft at midspan and bent forward near the tip. (See figure 14.)



Figure 11. Propeller hub. (Courtesy of Piper Aircraft)



Figure 12. Blade A.



Figure 13. Blade B.



Figure 14. Blade C.

Submitted by:

Kristyn Blocher
Air Safety Investigator