

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24LA117

ENGINE AND AIRFRAME EXAM SUMMARY REPORT

May 15 & 16, 2024

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A. ACCIDENT

Location: Acton, CA
Date: March 22, 2024
Time: 18:04 Pacific daylight time
Airplane: N1695H, Piper PA-28-140

B. ENGINE AND AIRFRAME EXAM SUMMARY REPORT

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C. SUMMARY

Examination of the engine and airframe was conducted at the facilities of SouthWest Transportation & Recovery Inc., Chino, California on 5/15/24. The engine was test run at the facilities of Cam-Lu Consulting on 5/16/24, Corona, California.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe examination

Hobbs: 0341.2
Tach: 2603.73
Throttle: Full
Mixture: Lean
Carburetor Heat: Off
Magnetos: Off
Fuel Selector: Off
Fuel Pump: Off
Flap: Up

The right wing was cut at the wing root during wreckage recovery. Fluid consistent with 100LL aviation fuel was drained from the right wing fuel tank by wreckage recovery personnel (see figure 1). The underside of the right wing displayed denting and crushing throughout. The right aileron had gouging damage consistent with

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impact with terrain. The right wing fuel sump was missing, and the sump threads displayed damage. The right wing fuel cap was found in place and secure.

The left wing was cut at the wing root during wreckage recovery. Fluid consistent with 100LL aviation fuel was drained from the right wing fuel tank by wreckage recovery personnel (see figure 2). The left wing displayed denting and crushing along the length of the leading edge. The left aileron displayed bending and creasing consistent with impact with terrain. The left wing fuel cap was found in place and secure.



Figure 1: View of sample drained from right fuel tank. Figure 2: View of sample drained from left fuel tank.

The stabilator was removed by recovery personnel. It displayed denting throughout. The rudder remained attached at its attachment points and was undamaged. The fuselage displayed denting along the aft section, on the right side.

The fuel lines at both left and right wing roots were cut by wreckage recovery personnel during recovery. Air was applied to both lines and both were found to be clear to the wing fuel tanks and wing fuel vents.

The gascolator was found to be secure via the bail nut. The gascolator screen was free of debris. Blue fluid consistent with 100 LL aviation fuel was found in the gascolator cup and free of debris.

The battery was connected, and the electrically driven fuel pump was turned on via the cabin mounted fuel pump switch. The pump was heard running and fuel flowed out of the fuel line at carburetor inlet. All fuel lines forward of the fire wall and to the carburetor inlet contained residual fuel and were found to be free of blockage.

Cable continuity was established between the cabin mounted throttle and mixture controls, to the carburetor. The carburetor mounted throttle and mixture arms were bent, partially binding their travel. Cable continuity was established between the cabin mounted carburetor heat control and the airbox.

The cable attachment at the airbox mounted control arm was wrapped around the attachment bolt, sandwiched between washers, and loose (see figure 3). The cable was not threaded through the attachment bolt and safety wire was not observed at the attachment. The arm attachment to the airbox wall was loose within its housing and displayed travel in multiple directions when the carburetor heat control cable was moved within its range of travel. The heat door inside the airbox appeared undamaged. Its rubber gasket edging appeared intact. The pivot joint/axle of the heat door displayed vertical travel within the airbox, when the arm attachment traveled inside its housing. Visible grooves were found within the airbox where the heat door had seated previously, representing previous seatings of the carburetor heat "ON" and "OFF" actuation positions.



Figure 3: View of cable attachment at airbox.

When the carburetor heat was actuated using the cabin mounted carburetor heat knob, travel was found to be restricted. Specifically, the cabin control range was

limited to between the midway point and the OFF position. When the cabin control was moved to the midway limit (in the ON direction), the carburetor heat door closed, blocking the filtered air inlet, and diverting the air from the muffler shroud (see figure 4).



Fig. 4: View of heat door closed in ON position, and cabin control knob at midway limit.

However, when the cabin control was moved to its OFF position, the carburetor heat door stopped at the midway point, such that both filtered and hot air from the muffler shroud were simultaneously entering the carburetor inlet (see figure 5).



Fig. 5: View of cable attachment at airbox and heat door with the carburetor heat at its full OFF position.

2.0 Propeller examination

Manufacturer: Sensenich
Model Number: 74DM6-0-54
Serial Number:

The fixed pitch, two bladed propeller remained attached to the crankshaft flange. Blade A was bent forward near the blade tip and displayed chordwise striations and leading edge gouging (see figure 6). Blade B was bent aft at mid span, and bent forward near the blade tip, with chordwise striations and gouging at the blade tip (see figure 7). The propeller spinner remained attached and undamaged.



Fig. 6: View of blade A.



Fig. 7: View of blade B.

3.0 Engine examination

Engine Manufacturer: Lycoming
Engine Model Number: O-320-E3D
Engine Serial Number: L46352-27A

The Champion REM40E park plugs were removed. All electrodes displayed 'Normal' wear signatures consistent with low service life, when compared to the Champion AV-27 Check-A-Plug guide, and were grey in color. Spark plug no 2 displayed black sooting. (See figure 8).

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Fig. 8: View of upper spark plugs.

A borescope examination was performed of all cylinder heads. Cylinders 1, 3, and 4 displayed brown and grey deposits to the piston head and cylinder dome. The no 2 piston head and cylinder dome displayed black deposits. All cylinder walls were shiny with crosshatching evident.

The rocker box covers were removed. Equal travel of the valve rockers was observed in each cylinder, when rotating the propeller by hand. Thumb compression was obtained on all cylinders.

The carburetor throat/venturi was free of foreign object debris.

The carburetor, magnetos, starter, and oil filter were not removed from engine, and were left in place for an engine test run.

The engine was removed and test run at the facilities of Cam-Lu Aviation Consulting. The left magneto timing measured 24° and the right magneto measured 27°. The no. 2 cylinder was borescoped, with similar sooting observations, and no evidence piston ring damage. The intake and exhaust valves were intact and coated in grey and black deposits, with no evidence of damage to either valve stem.

The engine was mounted to a test stand and a surrogate propeller (Sensenich 76EM8-0-60¹), was installed. The engine was primed and started on the first attempt. After three minutes at a low power setting, the engine speed was increased to simulate a ground run up. The magnetos were tested one at a time, the carburetor heat function was tested, all results were within normal ranges. The throttle was

¹ This propeller was oversized when compared to the propeller installed on the accident airplane.
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advanced to the full forward position, then decreased to 1700 rpm, increased to full, then decreased to idle, and cycled. The right magneto drop check was 100 rpm, the left magneto drop check was 65 rpm. The idle rise was 25 at 1000 rpm. Full static power was noted at 2,100 rpm. Total engine running time on the test stand was 11 minutes (see figure 9).



Fig. 9: View of engine on test stand during test run.

Submitted by:

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