

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR23LA197

ENGINE AND AIRFRAME EXAMINATION

June 14, 2023

A. ACCIDENT

Location: Redding, California
Date: May 20, 2023
Airplane: Cessna 210, N9433T

B. ENGINE AND AIRFRAME EXAMINATION

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NTSB

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C. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

The airframe sustained substantial damage to the tailcone, which had separated aft of the rear cabin bulkhead. Both wings remained attached, and the right wing was bent up at the wing strut attach point.

The engine remained partially attached to firewall, and with two of its aluminum mounts broken, had moved about 3 inches forward and down. There was no evidence of crankcase breach, nor was there any indication of an oil leak.

The airplane was not equipped with any engine instruments capable of recording engine parameters.

1.1 Fuel/Fuel System

The airplanes wings were removed during recovery. According to the Redding Airport Manager, more than 20 gallons of fuel was observed in each fuel tank following the accident.

The fuel filler caps, and corresponding filler neck appeared to be in good condition, and airworthiness records indicated a Monarch fuel cap and inlet STC was performed (STC SA2377CE) in July 2017. There was no evidence of blue fuel streaks or any other sign indicating a fuel leak to any of the airframe components.

The fuel supply lines were all intact on the firewall side, and their fittings were tight. The metered side fuel pressure indicator line had broken away from the fuel controller. The line was made of rubber and was brittle and had limited flexibility. There were white oxidization-like deposits at the break in the fitting, and the rubber remnants of the line could be easily broken off (see figure 6).

The selector valve was found in the "LEFT" tank position. It could be smoothly moved through all the detents, with no binding apparent. Fuel was drained at the firewall fitting into the engine driven fuel pump at each selector position, for a total of 200mL of fuel. The fuel was light blue in color and had the odor of aviation gasoline. It was negative for water when tested with water detecting paste.

The fuel lines were tested in each selector position by lightly blowing air from each wing root fitting by mouth. No obstruction was observed, and flow stopped in the "OFF" position.

The fuel strainer control was in the "CLOSED" position.

2.0 Engine Examination

Engine Model: IO-470E17B

Engine SN: 088754-R

Continental Aerospace records indicated that the completion of the last engine overhaul was completed on June 16, 1995. The overhaul included the rebuild of the fuel control and fuel pump components. Continental did not have any records of any component coming back for overhaul since that date.

The air intake box assembly was intact, and the air filter was clear and free of debris. The air box internal passages were clear, and the alternate induction hot air flapper move freely, because its control line had detached. The detachment appeared consistent with forward movement of the engine on impact. The alternate air and cabin heat ducting (SCEET) tubes were intact, free of breaches, and remained connected at both ends.

Removal of the air box assembly revealed the interface gasket was installed back to front, resulting in an area reduction of about 10 % (figure 1).

All engine induction risers, elbows, and the balance crossover tube were intact, and their flexible couplings were tight and in place. The oil filter housing and oil filler neck were intact. The generator and its drivebelt were intact.

The throttle and mixture control cables were continuous from the cabin controls to their respective engine control arms. The throttle control was in the fully open position (and the butterfly valve within the throttle body was fully open) and operated smoothly. Similarly, the mixture control arm was in the full rich position and operated smoothly. The throttle and mixture mixing bellcrank assembly was intact and functioning. The throttle and mixture arms were securely attached to their respective shafts on the throttle and fuel control unit.

The engine driven fuel pump, oil pump, both magnetos, vacuum pump and hydraulic pump were all securely attached to their respective pads.

The fuel line from the strainer to the fuel pump, and the fuel pump to the fuel control unit was full of fuel. Fuel drained from the fuel pump inlet, outlet, and vapor return fittings during removal.

The line from the fuel control unit to the fuel manifold valve and all the fuel injector lines were empty. The fuel inlet screen to the fuel controller was free of debris. The fuel injection nozzles were all clear.

Removal of the fuel manifold valve cap revealed that the rubber diaphragm was intact and flexible, and the screen was clear. There was no fuel within the cavity, and brown rust-like oxidization was present in the area between the screen and the rubber seal, and in the forward plug within the valve cavity (figure 2,3,4).

The engine driven fuel pump was removed, and its drive coupling was intact. The input drive could be rotated smoothly by hand, and no binding was noted.

The top spark plugs were removed, and all exhibited dark grey and tan deposits, along with normal to worn out-normal signatures when compared with the Champion spark plugs AV-27 chart (figure 5).

The exhaust pipe exhibited light grey and tan deposits and was free of oil residue.

The crankshaft turned freely when rotated by hand utilizing the propeller, and cylinder compression was noted on all cylinders. Mechanical continuity was established throughout the rotating group, valve train, and accessory section. Sparks were observed at all top spark plug electrodes in firing order. Visual inspection of the combustion chambers was accomplished through the spark plug bores utilizing a borescope; there was no evidence of catastrophic internal damage. All combustion surfaces exhibited light grey deposits consistent with normal operation.

The magneto "P" leads in the engine compartment were tested utilizing a continuity tester. No short circuits to ground were observed.

The engine crankcase was one quart short of full, when checked with the engine oil dipstick. The oil pump was removed, and its gears were coated in oil, and free of debris or scratches, and displayed no evidence of heat distress.

The auxiliary fuel pump magnetic control valve was removed and appeared to be in the open position, and its check valve was functioning when blown through.

The magnetic control valve, fuel flow divider, all injector nozzles, and the fuel control unit were removed for further examination.

3.0 Propeller Examination

The propeller was essentially undamaged, with a slight bend observed to one blade, and a 1-inch-wide trailing edge gouge in the other. The governor was intact, and the control cable was continuous to the cabin control. Movement of the cabin control resulted in movement of the governor control arm.

4.0 Examination Photos

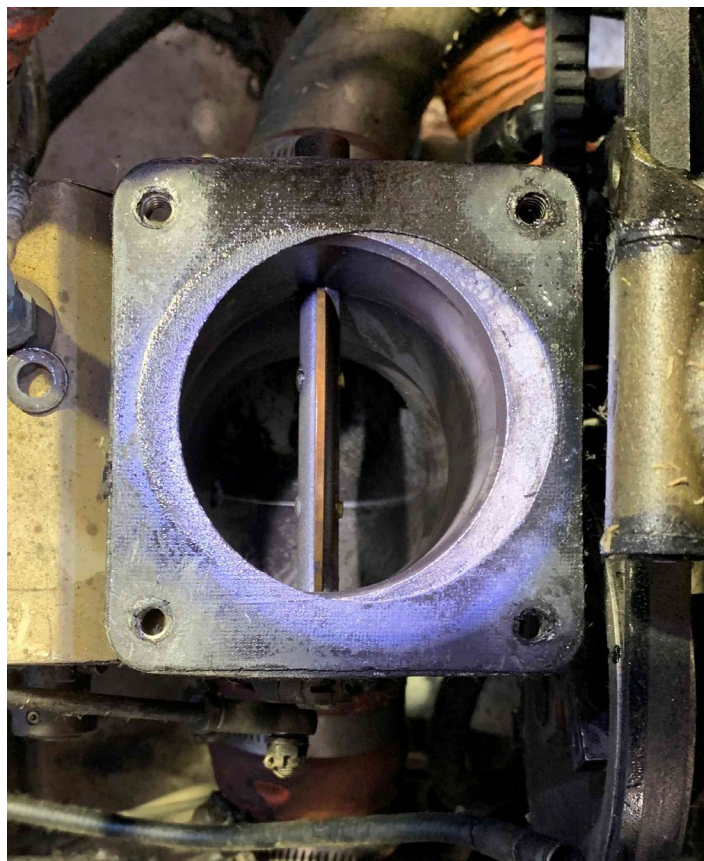


Figure 1 - Throttle body inlet gasket



Figure 2 - Fuel manifold screen with corrosion

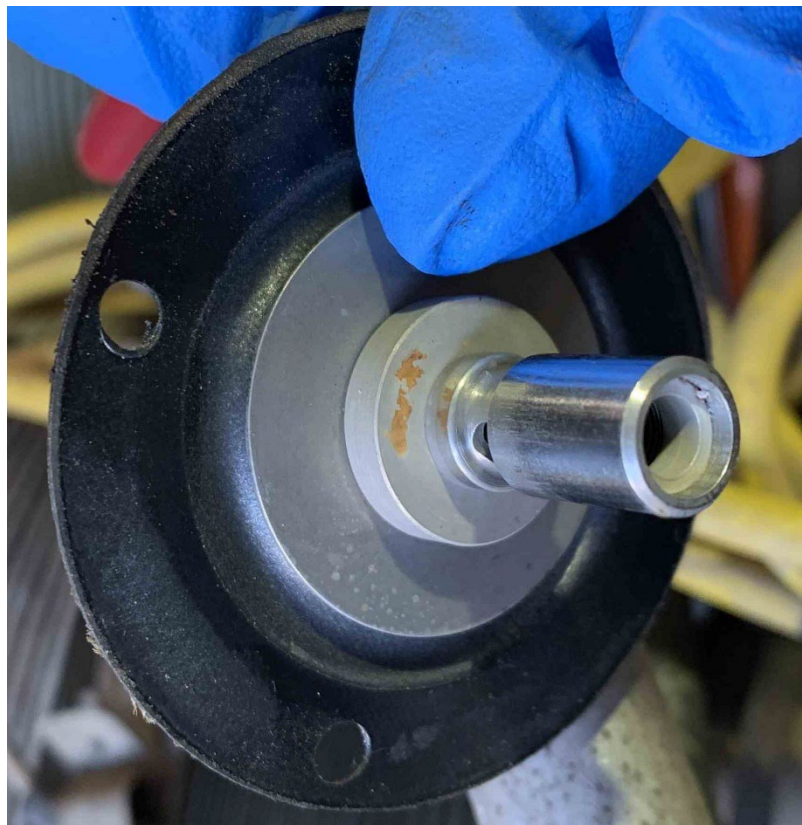


Figure 3 - Fuel manifold diaphragm with corrosion

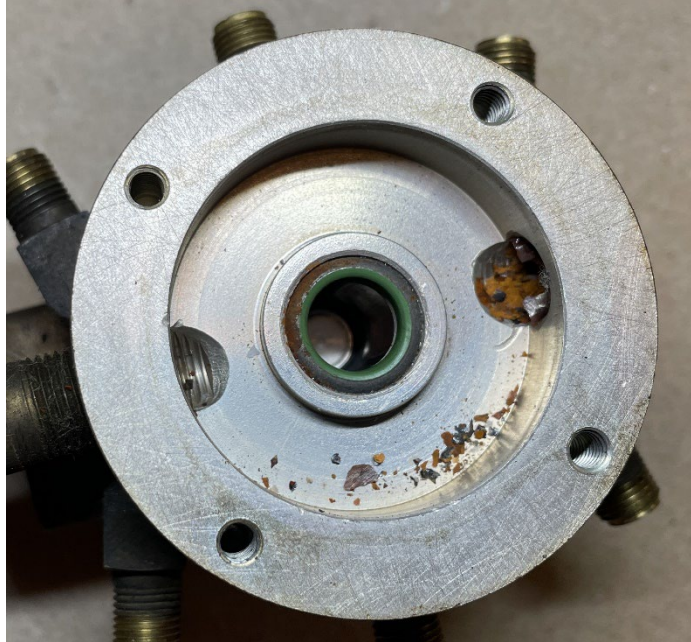


Figure 4 - Fuel manifold cavity with corrosion

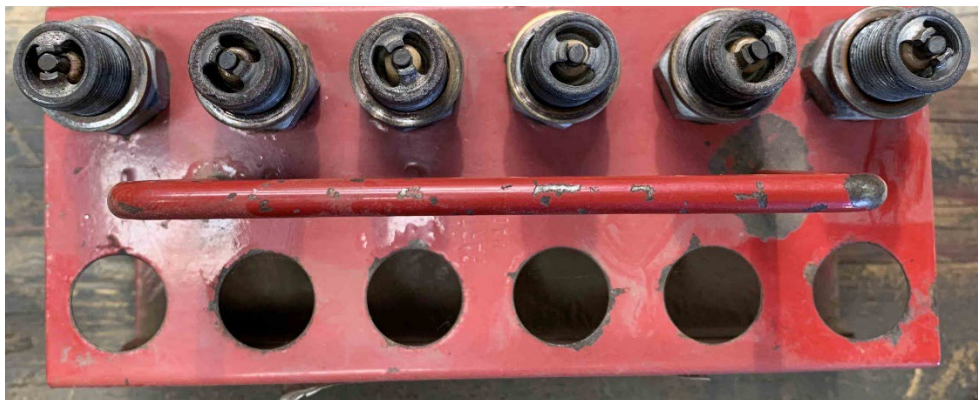


Figure 5 - Top spark plugs



Figure 6 - Fuel pressure line with corrosion and brittle rubber

Submitted by:
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