

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR23LA017

ENGINE EXAM ATTENDEES

11/3/2022

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A. ACCIDENT

Location: Mesa, AZ
Date: 10/18/2022
Time: 0740 Mountain standard time
Airplane: N747ML, Cessna 177R

B. ENGINE EXAM ATTENDEES

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C. SUMMARY

On October 18, 2022, about 0740 Pacific daylight time, a Cessna 177RG, N747ML, was substantially damaged when it was involved in an accident near Mesa, Arizona. The pilot sustained serious injuries. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

On the day of the accident flight, about 0624, the pilot reported that he departed with 28 gallons fuel and maneuvered to the north of FFZ, where he completed about an hour "break-in" flight, orbiting about 4,000 ft above the ground, at 65-75% engine power. The pilot maneuvered back to FFZ and was on a right base leg turn to final for runway 04R when the engine had a total loss of power. The pilot attempted to restart the engine but was unsuccessful, so he initiated a forced landing into a water canal. Prior to impact, the pilot nosed down the airplane and the airplane impacted a berm. Subsequently, the airplane came to rest in the water canal (figure 1) and sustained substantial damage to the left wing, fuselage, and engine truss. During the recovery of the airplane to a secured facility, about a cup of fuel was recovered from each fuel tank.

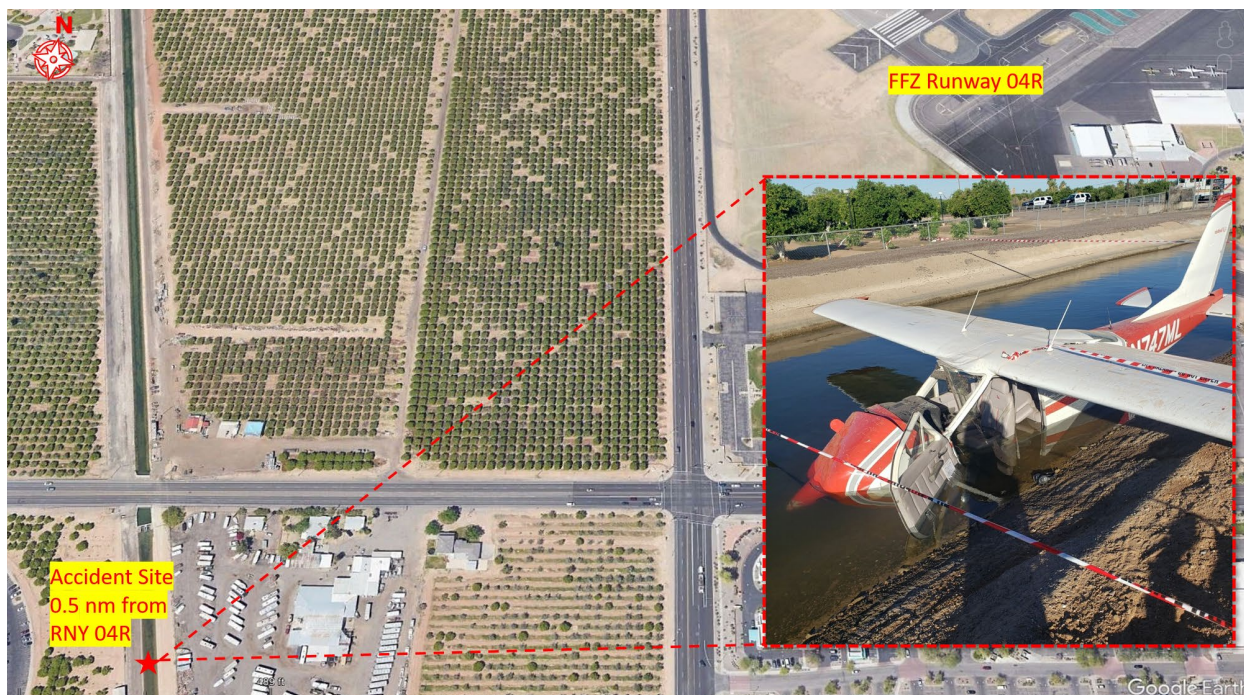


Figure 1. Google map view of wreckage location in relation to FFZ Runway 04R, with embedded picture of accident airplane in water canal.

D. DETAILS OF THE EXAMINATION

A cursory examination of the engine took place on October 18, 2022. The following was observed at that time:

- Engine exhibited no evidence of catastrophic machinal malfunction.
- Engine appears to be candidate for operational check.
- No oil residue on firewall and no evidence of fuel/oil leaks.
- Engine control continuity established from cockpit controls to respective engine components.
- Exhaust pipe coloration consistent with normal ops and absent of any oil residue.
- Single drive dual magneto secure at mounting pad.
- Some fuel was drained from Gascolator.
- JP Instruments EDM-930, S/N 03365 removed from instrument panel and retained for further disposition.

A follow-up examination was completed on November 1, 2022, with a Lycoming Engines Air Safety Investigator.

The powerplant is a four-cylinder, air cooled, direct drive, horizontally opposed, normally aspirated (fuel-injected), internal combustion engine rated at 200hp @ 2700rpm.

1.0 Engine Examination

The engine remained attached to the airframe by the engine mount. The engine had sustained no significant impact energy damage (figure 2). The engine mount tubing was deformed. Visual examination of the engine revealed no evidence of pre-impact catastrophic mechanical malfunction or fire.



Figure 2. View of accident engine

The starter, alternator, and vacuum pump remained secured to its respective mounting pad. The oil filter was secure at the mounting pad and was not removed for examination. The oil suction screen was secure at the mounting and was not removed for examination.

The fuel injection servo remained securely attached at the mounting pad of the plenum. The throttle/mixture controls were found securely attached at their respective control arm of the servo. The castellated nut and cotter pin remained secure and the serrated interface at the throttle arm remained securely mated. The

plug on the side of the injector body was secure with the safety wire in place. Control continuity to the cockpit controls was established.

The fuel flow divider (aka: spider) remained secure at the mounting bracket situated at the top of the engine. The fuel lines remained secure at each flow divider fitting and fuel injector at each cylinder. The flow divider was not disassembled.

The fuel nozzles "GAMIjector STC # SE09445SC" were not removed. The fuel pump was attached to the engine at the mounting pad. The fuel lines remained secure at their respective fittings. The fuel pump was not removed for examination.

The top spark plugs were removed, examined and photographed. The crankshaft was rotated by hand utilizing the propeller. The crankshaft was free and easy to rotate in both directions. "Thumb" compression was observed in proper order on all four cylinders. The rocker box covers were not removed. Mechanical continuity was established throughout the rotating/reciprocating group and accessory section during hand rotation of the crankshaft.

The combustion chamber of each cylinder was examined through the spark plug holes utilizing a lighted borescope. The combustion chambers and bottom spark plug electrodes remained mechanically undamaged and there was no evidence of foreign object ingestion or detonation.

The valves were intact and undamaged. There was no evidence of valve to piston face contact observed. The gas path and combustion signatures observed at the spark plugs, combustion chambers and exhaust system components displayed coloration consistent with normal operation. There was no oil residue observed in the exhaust system gas path.

During the hand rotation of the propeller (actuation of the engine driven fuel pump) investigators noted fuel leaking to the ground. Further examination found the fuel line from the fuel injection servo to the flow divider was leaking at the baffle union fitting (figure 3). The fitting would leak fuel during propeller rotation and operational pulses of the engine driven fuel pump, thus indicating the subject pump was functioning. (See video attached in the docket)

Examination found the B-Nut fitting could be hand rotated ½ turn till seated by hand. There was no physical damage to the fitting or evidence of any accident-related impact energy within the surrounding area of the fitting. Fuel staining could be observed on the baffle surface as pictured below. The remaining fuel lines remained secure at each of the respective fuel system components.

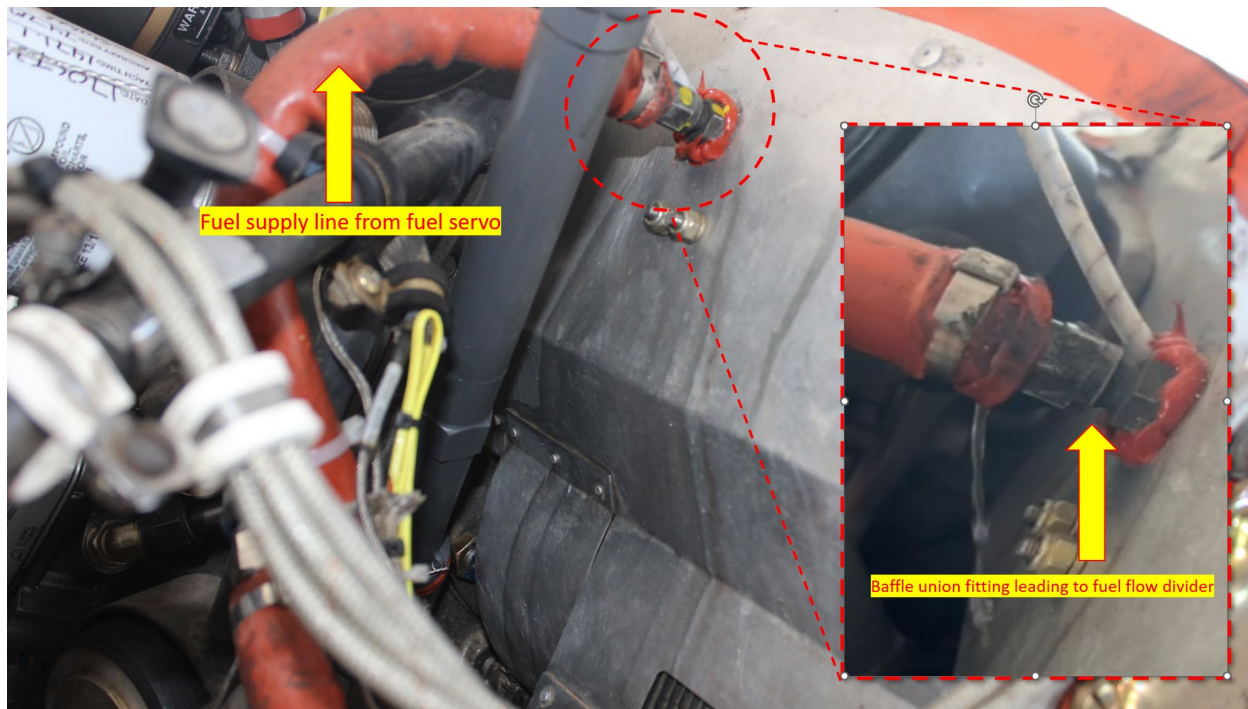


Figure 3. View of fuel supply line from fuel servo with overlaid close-up view of baffle union fitting connection (photo courtesy of engine manufacturer)

2.0 Magnetos

The single drive dual magneto was found securely clamped at the mounting pad. The impulse coupling was heard clicking during rotation of the crankshaft. The magneto was not removed or tested.

3.0 Spark Plugs

The spark plugs were secure at each position with their respective spark plug lead attached. The spark plugs were removed, examined and photographed. The spark plugs electrodes remained mechanically undamaged, and according to the Champion Spark Plugs Check-A-Plug chart AV-27, the spark plugs electrodes displayed coloration consistent with normal operation.

4.0 Propeller Examination

The two bladed constant speed propeller remained securely attached at the crankshaft flange (figure 4). The fiberglass spinner was attached to the propeller. The propeller blades remained attached to the propeller hub. One propeller blade was partially displaced from the hub socket and was bent aft about 45 degrees near the hub. The opposing blade exhibited very localized chordwise striations across the tip.



Figure 4. View of damaged propeller (photo courtesy of engine manufacturer)

The propeller governor was securely attached at the mounting pad with the pitch control rod securely attached at the control arm. The governor was not removed for examination. The control linkage remained continuous to the cockpit mounted control.

Submitted by:

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