

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24LA066

ENGINE/FUEL SYSTEM EXAMINATION

January 3, 2024

ACCIDENT

Location: Asheville, North Carolina
Date: December 14, 2023
Time: 2015 EST
0015 UTC
Airplane: N907L

ENGINE/FUEL SYSTEM EXAMINATION

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SUMMARY

On December 14, 2023, at 2015 eastern standard time, a Diamond Aircraft Ind. Inc. DA-40 NG airplane, N907L, was substantially damaged when it was involved in an accident near Asheville, North Carolina. The flight instructor sustained minor injuries and the private pilot was seriously injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 instructional flight.

The flight instructor and private pilot were conducting a cross-country flight at night when they felt a "shudder" followed by a loss of engine power. The loss of power was accompanied by a loss of oil pressure and dual engine control unit (ECU) failure. The flight instructor took control of the airplane and used the checklist to restart the (diesel) engine. The engine restarted momentarily but again lost power shortly after. The flight instructor was able to restart the engine again, but the cockpit began to fill with smoke before the engine lost power a final time. The flight instructor then made a forced landing to an interstate. Just prior to landing, the airplane struck an energized power line, and the airplane impacted the ground and caught fire.

DETAILS OF THE EXAMINATION

The engine and fuel system were examined on January 3-4, 2024, at Atlanta Air Salvage, Griffin, Georgia, United States. The engine and composite airframe sustained extensive fire damage back to the aft fuselage.

The engine control unit (ECU) was partially attached by wiring and removed from the airplane. The unit's casing was exposed to fire and heat damage. The back of the unit was opened to examine the interior control boards and a strong smell of silicone was noted. The interior of the unit was photo-documented, and the back panel was re-installed. The unit will be shipped to the NTSB Recorders Lab in Washington DC for download.

The wings for the airplane had been removed from the fuselage during salvage. Both fuel caps were still installed to their respective wing. The left-wing cap exhibited soot deposits and was intact. The cap's o-ring was noted to be loose and protruding from the cap at the 6:00 o'clock position. The right fuel cap exhibited soot deposits. A portion of the cap's o-ring was missing, and one end exhibited a 45-degree fracture. There was evidence of the fuel resistant sealant (blue) to the mating surfaces between the fuel filler cap along with the mating hardware on the right fuel cap. The mating surface of the left fuel cap was not examined.

About 1 tablespoon of clear-colored fuel was initially removed from the right-wing tank. A small bubble of water was observed in the fuel sample. Both fuel tanks were then removed from each wing, and were mostly intact; however, some breaching from impact was noted. The left and right wing's fuel "finger" screens were removed, and both were absent of debris. Additional fuel (about a ½-cup) was later removed from the right tank. The fuel was clear in color but appeared cloudy. No fuel was recovered from the left tank.

A drop of clear colored fuel was removed from the high-pressure fuel pump's return line in the engine compartment; however, no fuel was found in the main fuel supply line to the pump.

The high-pressure fuel pump was discolored from heat/fire exposure and was removed from the engine. The pump rotated freely by hand. The pump was disassembled and, a small amount of clear-colored fuel was observed in the pump chamber. No mechanical anomalies were noted with the high-pressure fuel pump.

The firewall fuel filter was exposed to heat/fire and dark in color. No fuel was found in the filter bowl, and the filter (which also sustained partial heat damage), was absent of debris.

The coolant tank exhibited heat damage. The blue coolant was observed to be crystallized inside the tank.

The turbocharger was removed and rotated freely.

The propeller governor was removed and rotated freely. The gasket screen was absent of debris.

The oil filter was exposed to fire/heat. The filter was removed from its canister, and metallic flakes were observed.

The oil pump was exposed to fire/heat. The pump would not rotate initially and was disassembled. The wall of the pump was pushed into the gears from impact. Once the wall of the pump was moved away from the gear, the pump rotated freely.

The oil sump was removed and filled with small pieces of metal. Some of these pieces were identified to be part of a piston. A section of piston ring was also observed.

The engine was then disassembled. The four Bosch fuel injectors were removed from the engine and appeared to exhibit normal wear.

The two camshafts were removed and were not damaged.

No. 1 Cylinder – Piston head only. Skirt exhibited deterioration. No wrist pin. Piston head heat damaged.

*Note – A connecting rod had separated from the engine and was found by the initial recovery company sitting on the Interstate. It was not determined which cylinder (either No. 1 or the No. 2) the rod belonged too. The copper piston pin bushing was missing.

No. 2 Cylinder – No items recovered. (*see Note above)

No. 3 Cylinder – All present. Piston exhibits heat damage, wrist pin, connecting rod/cap and two bearings were present.

No. 4 Cylinder- Piston exhibits heat damage and scoring on the skirt, wrist pin present, connecting rod and cap present. The connecting rod cap bearing was loose, and the connecting rod bearing was stuck to the rod.

Main Journal Bearings

No. 1- clean, no heat damage

No. 2-heat damaged, bearing(s) are scored and exposing copper and deterioration.

No. 3- heat damaged, bearing(s) are scored and exhibit copper coloring.

No. 4 - heat damaged, bearing(s) are scored and exhibit copper coloring.

Crankshaft removed. Exhibits heat discoloration on No. 1, No. 2, and No. 4 connecting rod journals. No. 1 and No. 2 connecting rod journals exhibit damage. Significant Discoloration to the No 4 supporting journal.

Submitted by: Leah Read, Sr. ASI
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