



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

August 11, 2022

ENGINE EXAMINATION SUMMARY

WPR22LA211

This document contains 12 embedded photos.

A. ACCIDENT

Location: Fairfield, Utah
Date: June 9, 2022
Aircraft: N46JH; Rans S-21

B. PARTICIPANTS

Andrew Swick-NTSB IIC
Jordan Paskevich-Rotax
Jim Harvey-Airplane Owner

C. SUMMARY

Examination of the wreckage was conducted at the owner's hangar at the West Desert Airpark (UT9), Fairfield, Utah, on August 11th, 2022. The postaccident examination of the airframe and engine revealed impact damage to the forward fuselage and cabin area. The airplane's fuel system was not setup as per the Rotax design specifications.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

The airplane was positioned in the owner's hangar for the examination. The main gear had impact damage and was pushed aft from its original position. The fuselage had impact damage and had deformation to the cabin area. The engine cowling and propeller assembly had impact damage and remained partially attached.



Figure 1-Main wreckage, view of the forward left side.

The wings had minor damage and the right wing was partially attached to the fuselage. The elevator had impact damage and separated from the left outboard attachment.



Figure 2-Main wreckage, view from the aft.



Figure 3-Main wreckage, right side view.

The wing tanks remained intact, and the fuel caps were secure and unremarkable. The wing tank supply lines were undamaged and remained attached to the header tank located on the aft cabin floor. The supply lines had shutoff valves attached at (pilot) head level and were found in the open position. The header tank is about 5 gallons in capacity and positioned sideways with its filler cap halfway down the front side of the tank. (See Figure 4.) The fuel return line from the engine was attached and secured to the aft right side of the tank.

The header tank did not have a venting line and the header tank cap was not a vented type. According to the Rotax Installation Manual, the venting line from the header tank to the wing tank should generally be on an incline to avoid trapping bubbles. The venting line must have an inner diameter of at least 12 mm (0.05 in).

The outlet line and a shutoff valve were secured to the lower forward side of the header tank.

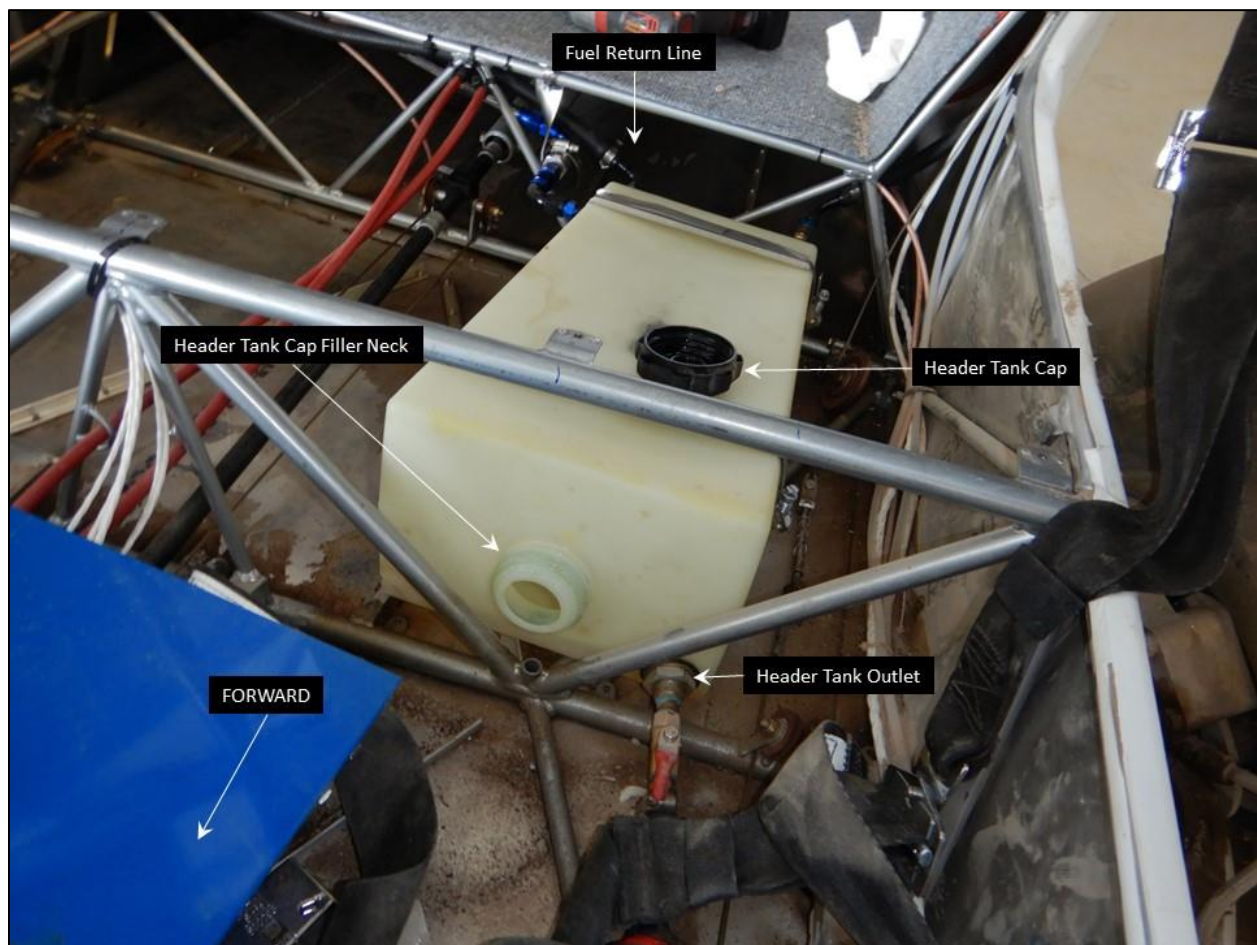


Figure 4-Header tank.

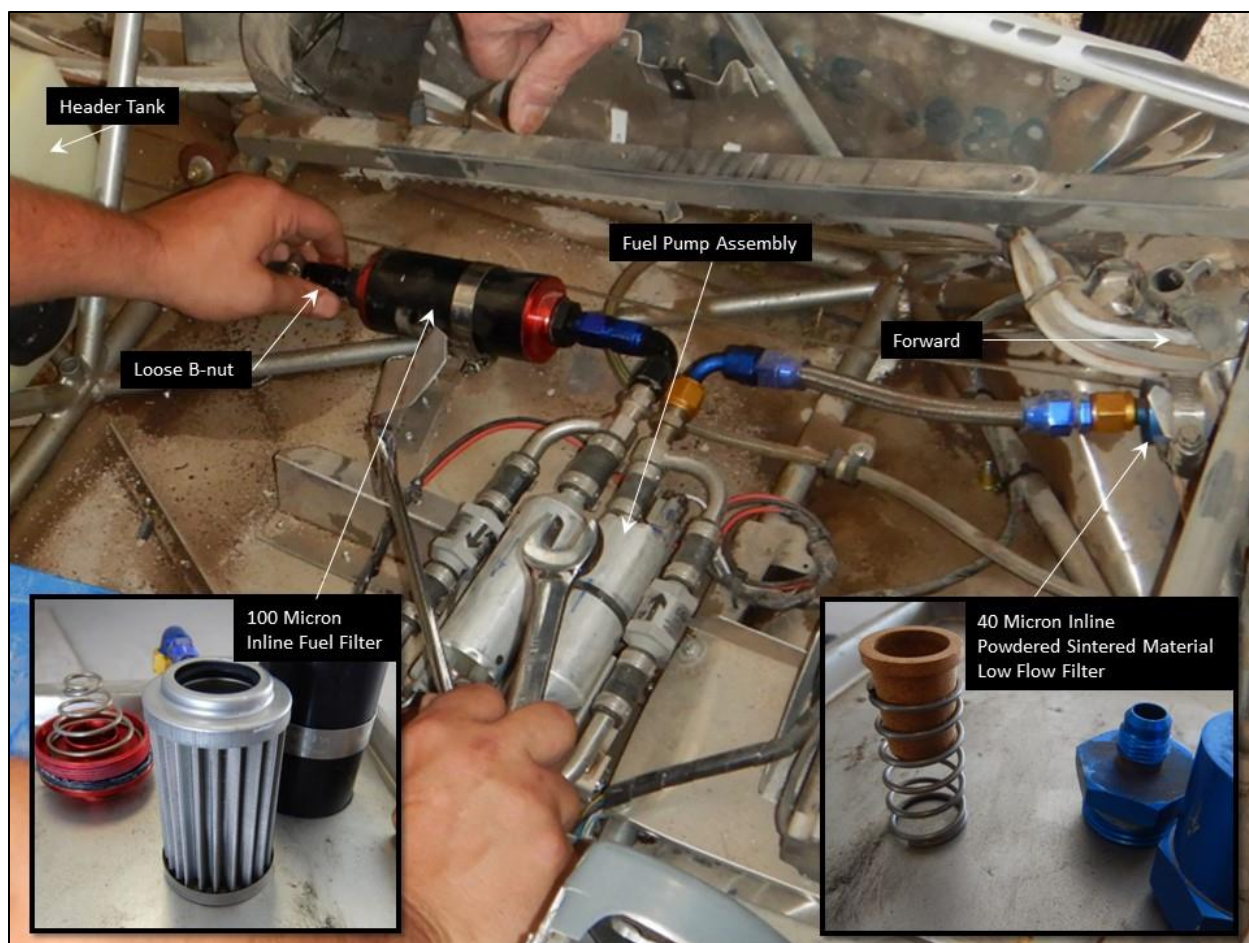


Figure 5-Airframe fuel system, cabin area.

A 100-micron inline fuel filter was attached to the outlet line from the header tank. The inlet b-nut fitting to the filter assembly was finger loose. Fuel dripped from the fitting during the initial turns of the fitting. The filter was disassembled, and the screen was clear of debris. A sealant was noted on the O-ring and cap. The fuel pump assembly was attached to the floor with plastic zip ties. One of the zip ties separated. The pump operated normally when initiated from the instrument panel. A 40-micron inline low flow fuel filter was attached to the high-pressure side of the fuel system after the fuel pump. The filter was removed and disassembled. Small amounts of contaminants, consistent with the O-ring sealant was noted in the filter cavity. Airflow was restricted when blown air was applied to the powdered sintered material filter. A shutoff valve on the high pressure supply line was located near the pilot's knee area.



Figure 6-Gascolator, disassembled.

The gascolator was removed from the wreckage and the inlet fitting had impact damage. The internal screen was undamaged and clear, and the cavity bowl contained automotive type fuel and was free of contamination.

2.0 Engine Examination

The engine remained attached to the fuselage and was mostly intact. The propeller assembly remained attached to the engine. Each of the three blades had impact damage to their midsections. The upper and lower engine cowlings had impact damage and remained partially attached to each other and the fuselage attachments. The cowling was removed, and the engine was covered in a layer of dust and dirt. The induction tubes from the turbocharger to the intercooler separated at their attachments. The lower engine coolant cooler had impact damage and was pushed upwards in the center. The flexible induction tubes were removed, and the engine intake was boroscoped. No foreign objects were found in any of the intake tubes. The induction tube near the turbocharger shows some thermal damage in a small section. The tubes internal surfaces were undamaged.



Figure 7-Engine and propeller assembly, right side view.

A restricted bypass line between the inlet (pressure side of the fuel pump) and the return line was not installed on the engine. This bypass line allows venting of the fuel system after a potential inclusion of air.

The upper spark plugs were removed and showed normal operating signatures.



Figure 8-Upper spark plugs.

The cylinders were boroscoped and the combustion chambers showed damage consistent with detonation. No other damage or anomalies were noted during the boroscope examination.

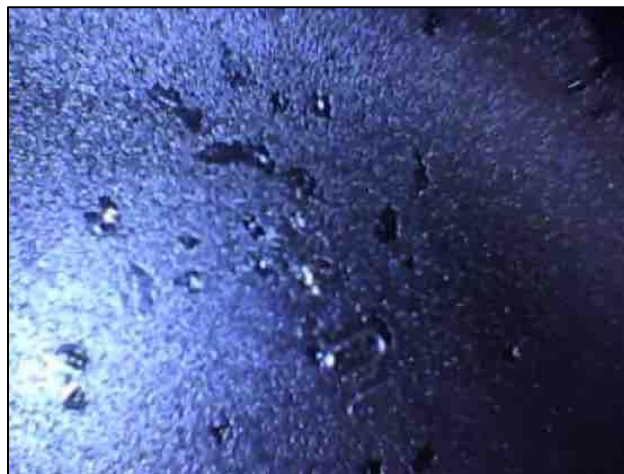


Figure 9-Piston marks, position unknown.

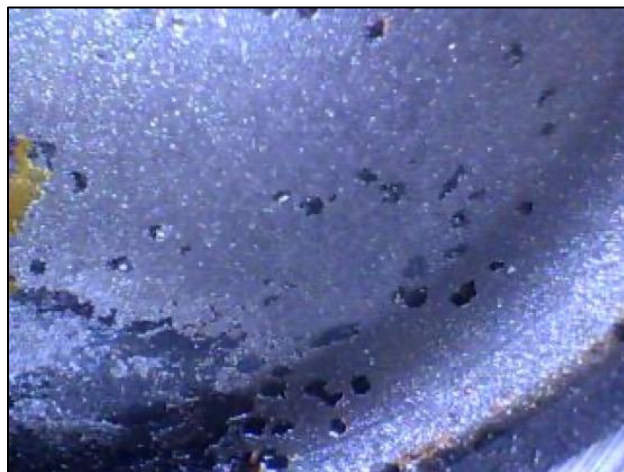


Figure 10-Piston marks, position unknown.

The crankshaft was rotated by hand and thumb compression was obtained from each cylinder. The engine control unit was successfully downloaded.

The Dynon flight instrument engine monitoring data was successfully downloaded.

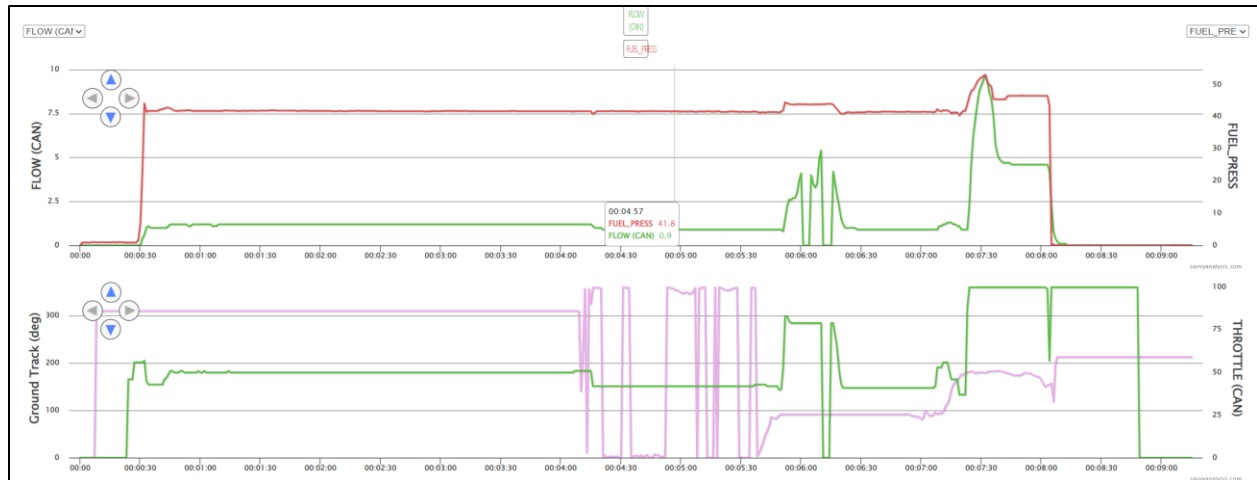


Figure 11-Dynon data.



Figure 12-Dynon data.

The downloaded data was uploaded to a program to complete a readout of the data. The data reveals a fuel flow that is not consistent with the fuel pressure during throttle movement.

There were no evidence of mechanical malfunctions or failures with the airframe or engine that would have precluded normal operation.

Submitted by: Andrew Swick