



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Central Region

October 27, 2021

AIRFRAME AND ENGINE EXAMINATION

CEN21LA265

This document contains 26 embedded photos.

A. ACCIDENT

Location: Columbus, OH
Date: June 14, 2021
Aircraft: Cessna 180K, Registration N13159, Serial #18053166
NTSB IIC: Samantha Link

B. EXAMINATION PARTICIPANTS:

Samantha Link
Aviation Accident Investigator
National Transportation Safety Board
Denver, Colorado

Todd Caruso
Principal Maintenance Inspector
Federal Aviation Administration
Columbus, Ohio

Henry Soderlund
Chief Air Safety Investigator
Textron Aviation
Wichita, Kansas

C. SUMMARY

Examination of the airframe and engine was conducted on October 27, 2021, at the facilities of Rex Air in Fremont Ohio. Fragments of sealant were noted in the left-wing fuel tank, otherwise no anomalies were noted during the examination.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

- The airplane's wings, horizontal stabilizer, and propeller assembly had been previously removed for recovery purposes.
 - The spinner had also been previously removed. No rotational scoring or markings were noted, consistent with the impact sequence.
- The Leading edge of the left and right horizontal stabilizers were crushed aft.
 - Elevator control continuity was established.
- All flight controls surfaces remained attached.
- Cabin area remained mostly intact:
 - The seats remained attached to the seat rails.
 - STC installed shoulder harnesses were present.
 - The fuel selector valve was found in the off position.
 - The firewall shut off valve was found in the on position.

- All cockpit switches were found in the off position.
- The manual flap handle was found fully extended.
- Tachometer reading: 742.4 hours.
- Hobbs reading: 4687.8 hours.
- Several modifications were noted to the airplane:
 - It had been modified from a carbureted engine to a fuel injected engine (STC installation), which included a header fuel tank forward of the fuel selector valve.
 - The wings had been changed from bladder fuel tanks to integral fuel tanks.
- The right-wing leading edge was crushed aft consistent with impact damage.
 - The outboard half was crushed further aft than the inboard.
- The right-wing fuel tank fuel cap was not present. The fuel tank access panels were removed:
 - The right fuel tank was intact, and no anomalies were noted inside of the tank.
 - Both fuel tank finger screens were clear of debris.
- A large circular dent consistent with tree damage was noted on the inboard portion of the left wing and left fuel tank.
 - The left-wing fuel tank was breached.
 - Fuel cap remained in place and was secured.
- The left-wing fuel tank access panels were removed, and several things were noted within the fuel tank:
 - Fragments of off-white sealant were found loose within the fuel tank. These fragments varied in size from very small to about an inch.
 - This sealant appeared to have been applied to the vertical and lower skin structure of tank. It is unknown when this application occurred.
 - The sealant exhibited cracking and flaking. It easily flaked off when touched by a finger.
 - The middle and outboard wing drains had a grey color sealant observed over the off-white sealant.
 - About a dozen small globs of grey sealant were also observed loose in the fuel tank. Each were about $\frac{3}{4}$ centimeter in length and about 2 millimeters wide.
 - The finger screens were clear of debris.
- The fuel strainer was removed, and a lot of fuel exited from the strainer during the removal process.
 - The bowl was removed and was clear of debris.
 - No water was observed within the fuel that drained from the fuel strainer.
 - Minor dark substance was noted in the fuel strainer screen, but the screen was otherwise clear of debris.
- Air was blown into the fuel lines at both wing roots and fuel was expelled through the fuel strainer.
 - The fuel selector valve was manipulated during this process, and it functioned normally in all positions.
 - The selector valve had noticeable detents.

- The battery was not present; therefore, the electrical system could not be tested.

1.1 Airframe photos



Figure 1: Right Side of Fuselage



Figure 2: Left Side of Fuselage



Figure 3: Left Wing

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Figure 4: Right Wing



Figure 5: Horizontal Stabilizers



Figure 6: Instrument Panel



Figure 7: Fragments of Sealant in the Left-Wing Fuel Tank

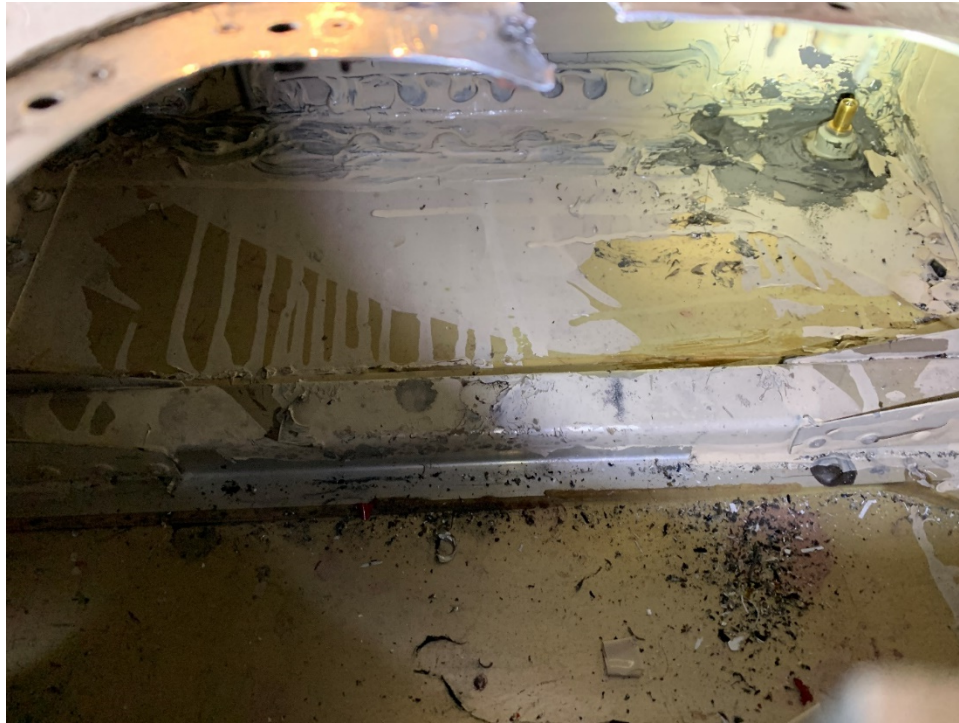


Figure 8: Inside of Left Fuel Tank



Figure 9: Fuel Strainer



Figure 10: Fuel Draining from Fuel Strainer



Figure 11: Fuel Strainer Screen

2.0 Engine Examination

- The engine cowling was removed and there were no visual signs of catastrophic failure.
- The fuel distributor was disassembled:
 - No fuel was observed within the distributor.
 - The diaphragm was slightly stiffer than normal and stuck to the lid of the fuel distributor.
 - The spring was intact and exhibited black staining on the small side of the spring. Corresponding staining was noted on the lid of the fuel distributor.
 - Dried white staining was noted on the larger side of the spring.
 - The spring and diaphragm were packaged for further examination at the NTSB materials laboratory.
 - The screen exhibited a very small piece of red fuzz but was otherwise clear of debris.
- The inlet line to the fuel flow transducer was removed and clear of debris.
 - Air was blown through the fuel transducer and no blockages were noted.
- The upper spark plugs were removed:
 - The number 1 spark plug exhibited heavy deposits that were dark in color.
 - The number 2 spark plug was consistent with lean operations.
 - The number 3 spark plug was consistent with normal operations. With one small area of deposits.
 - The number 4 spark plug was consistent with normal operations.
 - The number 5 spark plug was dark in color with some deposits.
 - The number 6 spark plug was dark in color.
- The nozzles were removed from the engine:
 - The number 2 nozzle exhibited a minor particle and small blockage, but you could still see through it.
 - The debris did not exit the nozzle when tapped.
 - All other nozzles were clear of debris.
- All engine fuel lines remained secured, and air passed through them.
- The propeller was placed back onto the crankshaft, and it was rotated by hand. No binding was noted, and corresponding motion was noted on the vacuum pump drive.
 - Thumb compression was established on all cylinders.
 - The magneto impulse coupling was heard.
 - Spark was obtained on all upper ignition leads.
- The engine was removed from the engine mounts and firewall.
- The fuel pump was removed, and the drive gear was intact.
 - The fuel pump pumped water when rotated by a drill.
- All the accessory drive gears rotated when the crankshaft was rotated.
- The fuel control unit was removed.
 - The fuel screen was clear of debris.
 - Some minor leaking was noted at the fuel metering unit.

- The three bladed propeller assembly had been previously removed:
 - The three blades remained attached at the hub.
 - Two blades were bent aft about midspan.
 - The third blade was flattened.
 - None of the blades exhibited rotational scoring or markings.

Engine Photos



Figure 12: Front of Engine



Figure 13: Top of Engine

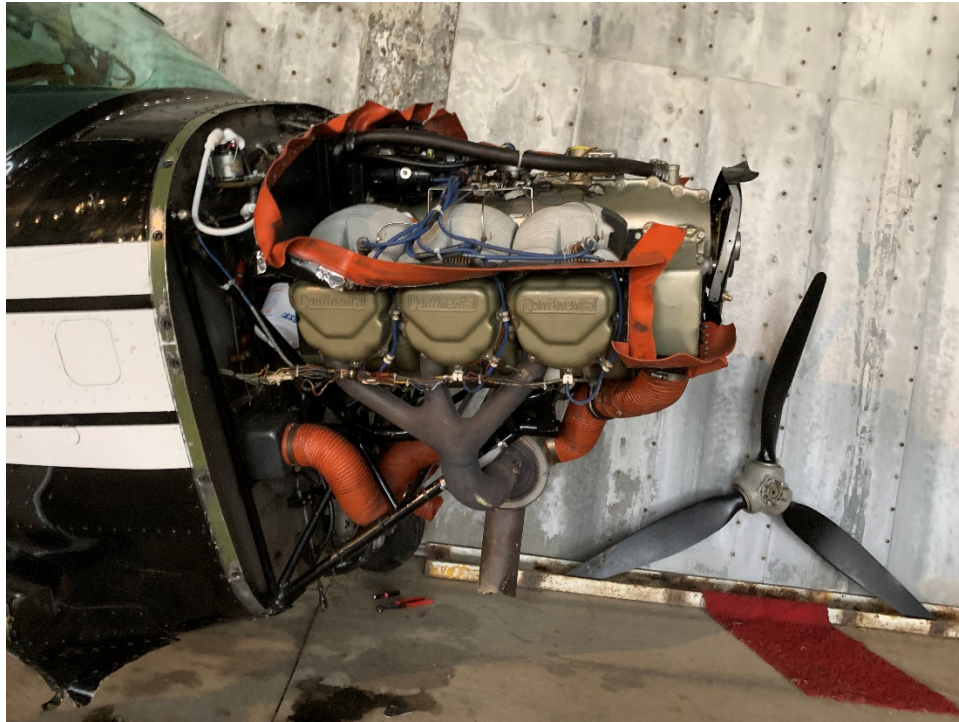


Figure 14: Right Side of Engine



Figure 15: Left Side of Engine

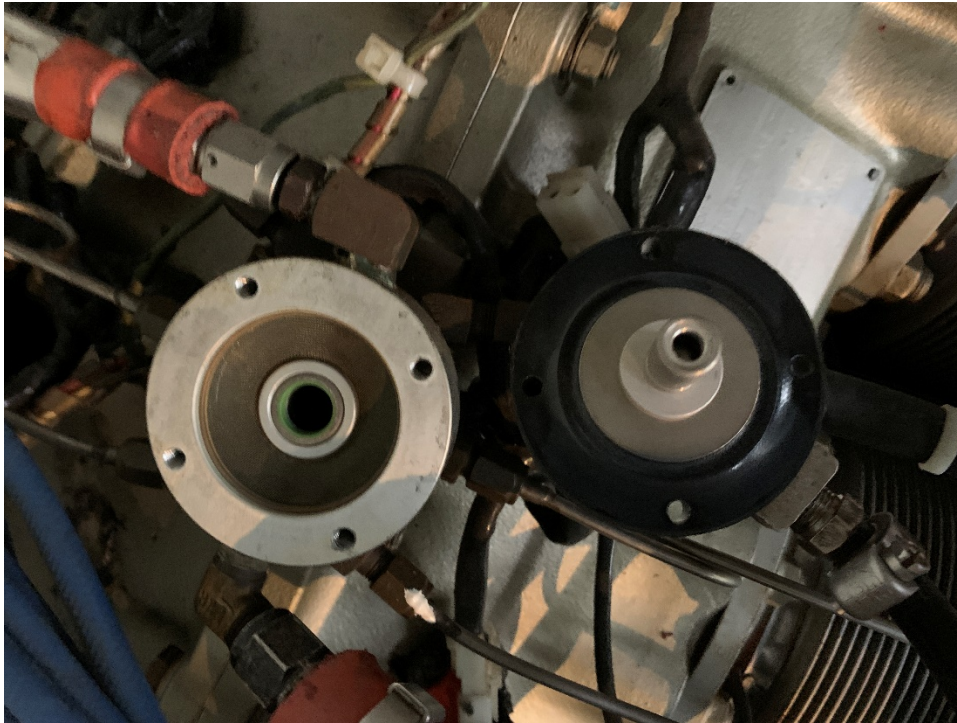


Figure 16: Inside of Fuel Distributor



Figure 17: Fuel Distributor Spring and Diaphragm



Figure 18: Smaller end of the Fuel Distributor Screen



Figure 19: Large end of the Fuel Distributor Screen



Figure 20: Fuel Distributor Screen



Figure 21: Upper Spark Plugs cylinders: 1 3 5



Figure 22: Upper Spark Plugs cylinders: 2 4 6



Figure 23: Aft Side of Engine



Figure 24: Firewall



Figure 25: Face side of Propeller Blades



Figure 26: Front of Propeller Blades

END.

Submitted by: Samantha Link