



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

February 27, 2020

AIRFRAME / ENGINE EXAMINATION SUMMARY

WPR20LA038

This document contains 0 embedded photos.

A. ACCIDENT

Location:	Phoenix, Arizona
Date:	December 11, 2019
Aircraft:	Piper PA-34-200T, N2822F
NTSB Investigator-in-Charge:	Joshua Cawthra

B. SUMMARY

The recovered wreckage was examined at the facilities of Air Transport, Phoenix, Arizona, by representatives from Piper Aircraft, Continental Motors Inc., and Federal Aviation Administration, along with the National Transportation Safety Board investigator-in-charge on February 26 and 27th, 2020.

C. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

The fuselage was mostly intact and the forward portion of the fuselage, just forward of the cabin area, was bent downward and partially separated. The right wing was separated at the wing root. The left wing was cut by recovery personnel just outboard of the left engine to facilitate wreckage recovery and transport. The empennage was intact with the exception of the right stabilator, which was cut by recovery personnel to facilitate wreckage transport. Wreckage recovery personnel reported that about 2 to 4 ounces of fuel was removed from the left-wing fuel tank prior to removal of the outboard section of wing. No fuel was observed in the right-wing fuel tank, however, they reported that a fuel spill was present on the ground under the wing.

The airframe boost pumps (left and right) were removed. Power was applied to both fuel pumps and they both functioned.

No obstructions were noted in any disconnected fuel lines.

During removal of combustion heater fuel pump, various fuel lines contained some fuel (less than 3 ounces) was observed.

The left fuel inboard and outboard fuel tanks were intact. The bladder tank between the inboard and outboard fuel tanks was breeched on the upper part of the bladder. Utilizing tape, the bladder tank was sealed, to prevent leakage for testing.

The left-wing fuel sending units were removed from the wing. Utilizing an ohm meter, the inboard and outboard fuel sending units were moved throughout their range of motion, while observing how much resistance was present. In a position consistent with empty, the 0.6 to 2.6 ohms. Throughout its range of motion, it produced anywhere from .6 to 82.5 ohms, and appeared inconsistent from full empty to about 10 degrees of travel toward full.

The outboard fuel sender was removed from the wing. Utilizing an ohm meter, the inboard and outboard fuel sending units were moved throughout their range of motion, while observing how much resistance was present. In a position consistent with empty, the 0.3 ohms. Throughout its range of motion, it produced anywhere from .3 to 49.8 ohms.

The fuel sender units were reinstalled in the left wing and jumper wires were connected to the fuel sending unit to the airframe. When no power was applied to the airframe, the left fuel gauge displayed about 9 gallons. When power was applied to the airframe, the left fuel gauge displayed about 14 to 15 gallons. Water was added to the fuel tank in 5-gallon increments until the fuel gauge indicated 40 gallons.

5 gallons: Gauge displayed about 20 gallons
10 Gallons: Gauge displayed about 25 gallons
15 Gallons: Gauge displayed about 29 gallons
20 Gallons: Gauge indicated about 32 gallons
25 Gallons: Gauge indicated about 35 gallons
30 Gallons: Gauge indicated about 38 gallons
34 Gallons: Gauge indicated about 40 gallons

The right-wing fuel tanks were breached, and prohibited functional testing of the fuel sender units in that wing. The fuel sender units were removed and subsequently installed in the left wing. When no power was applied to the airframe, the left fuel gauge displayed 0 gallons, and fully deflected left. When power was applied to the airframe, the left fuel gauge displayed 0 gallons and appeared to be fully deflected to the left. Water was added to the fuel tank in 5-gallon increments until the fuel gauge indicated 40 gallons.

5 gallons: Gauge displayed about 5 gallons
10 Gallons: Gauge displayed about 10 gallons
15 Gallons: Gauge displayed about 13 gallons
20 Gallons: Gauge indicated about 19 gallons
25 Gallons: Gauge indicated about 25 gallons
30 Gallons: Gauge indicated about 32 gallons
33 Gallons: Gauge indicated about 40 gallons
35 Gallons: Gauge indicated about 45 gallons

2.0 Engines Examination

Right Engine

Continental LTSIO-360-EB (2), S/N: 807346-R

The engine was mostly separated from its mounts. All engine accessories and propeller remained attached to their respective mounts. The upper spark plugs were removed. All 6 cylinders were examined internally using a lighted borescope and were unremarkable. The propeller was rotated by hand, and mechanical continuity was established throughout the engine

and valve train. Spark was obtained on all 12 ignition leads. Thumb compression was obtained on all cylinders, however, cylinder no. 4, had very little compression. The cylinder was removed, and debris consistent with carbon deposits was found on the intake valve seat and valve.

The fuel manifold valve was intact. Upon removal of the fuel manifold valve cover, the diaphragm and spring were intact. No debris was observed in the screen, and the fuel manifold valve cavity contained no evidence of fuel.

All 6 fuel injectors were removed and were free of debris.

The engine driven fuel pump was intact. No fuel was observed in any of the fuel lines connected to the fuel pump. The fuel pump was removed for functional testing. Using a hand drill, the drive shaft was rotated and flowed water from the inlet port throughout the exit port.

The throttle body was intact and when actuated by hand, the throttle plate moved from stop to stop.

The turbo charger was intact and rotated by hand.

The propeller governor was intact and the control arm moved stop to stop by hand.

All 6 upper spark plugs exhibited normal operational signatures and light gray deposits within the electrode area.

The exhaust system was free of blockages and exhibited impact damage.

The induction system was intact and free of blockages.

The propeller governor was intact and the drive shaft rotated by hand freely. When the drive shaft was rotated, oil was observed expelling from the governor unit.

Left Engine

Continental TSIO-360-EB (3), S/N: 809192-R

The engine was secured to its mounts. All engine accessories and propeller remained attached to their respective mounts. A twisted wire cable (powerline) was wrapped around the left propeller and crankshaft approximately 9 times. The upper spark plugs were removed. All 6 cylinders were examined internally using a lighted borescope and were unremarkable. The propeller was rotated by hand, and mechanical continuity was established throughout the engine and valve train. Spark was obtained on all 12 ignition leads. Thumb compression was obtained on all cylinders.

The fuel manifold valve was intact. Upon removal of the fuel manifold valve cover, the diaphragm and spring were intact. No debris was observed in the screen, and the fuel manifold valve cavity contained a slight amount of fuel (about ½ teaspoon).

All 6 fuel injectors were removed and were free of debris.

The engine driven fuel pump was intact. No fuel was observed in any of the fuel lines connected to the fuel pump. The fuel pump was removed for functional testing. Using a hand drill, the drive shaft was rotated and flowed water from the inlet port throughout the exit port.

The throttle body was intact and when actuated by hand, the throttle plate moved from stop to stop.

The turbo charger was intact and rotated by a hand tool attached to the hot side of the turbo.

The propeller governor was intact and the control arm moved stop to stop by hand.

All 6 upper spark plugs exhibited normal operational signatures and light gray deposits within the electrode area.

The exhaust system was free of blockages and exhibited impact damage.

The induction system was intact and free of blockages.

The propeller governor was intact and the drive shaft rotated by hand freely. When the drive shaft was rotated, oil was observed expelling from the governor unit.

Submitted by: Joshua Cawthra