



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region
January 18, 2017

AIRFRAME AND ENGINE EXAM REPORT

WPR17LA036

This document contains 17 embedded photos.

A. ACCIDENT

Location: Mecca, CA

Date: December 11, 2016

Aircraft: Textron Aviation T210M, Registration Number: N761SZ, Serial #: 21062493

NTSB IIC: Howard Plagens

B. EXAMINATION PARTICIPANTS:

Howard Plagens
Senior Air Safety Investigator
National Transportation Safety Board
Desert Hot Springs, CA 92240

Kurt Gibson
Senior Air Safety Investigator
Continental Motors Inc
Mobile, AL

Henry Soderlund
Senior Air Safety Investigator
Textron Aviation
Wichita, KS

C. SUMMARY

Examination of the recovered airframe and engine was conducted on January 18, 2017, at the facilities of Air Transport, Phoenix, Arizona, by investigators from the NTSB, Textron Aviation, and Continental Motors Inc (CMI). No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination



Photo 1 Front of Airplane with Engine Removed

The air filter had dirt on the front of the filter element. The nose of the airplane exhibited up and aft crush damage.

The throttle control in the cockpit, which was extended 2.5 inches and bent down, could not be moved forward. The mixture control cable moved in and out. The propeller governor cable pulled out when the governor control was manipulated.

The mixture arm at the engine was in a midrange position, and moved freely. The governor arm was connected and could be wiggled, but would not move toward either stop. The throttle at the engine was near the idle position, and moved freely.

The fuel selector valve and handle were both in the left main position.



Photo 2 Fuel Selector Valve Handle

The left fuel quantity indicator moved from a no power position to an empty position when power was applied to the aircraft. The right fuel quantity indicator was damaged. The right needle was observed to “jump” when power was applied to the aircraft. An ohm meter was attached to each fuel quantity float. A change in resistance was observed when each float was moved.

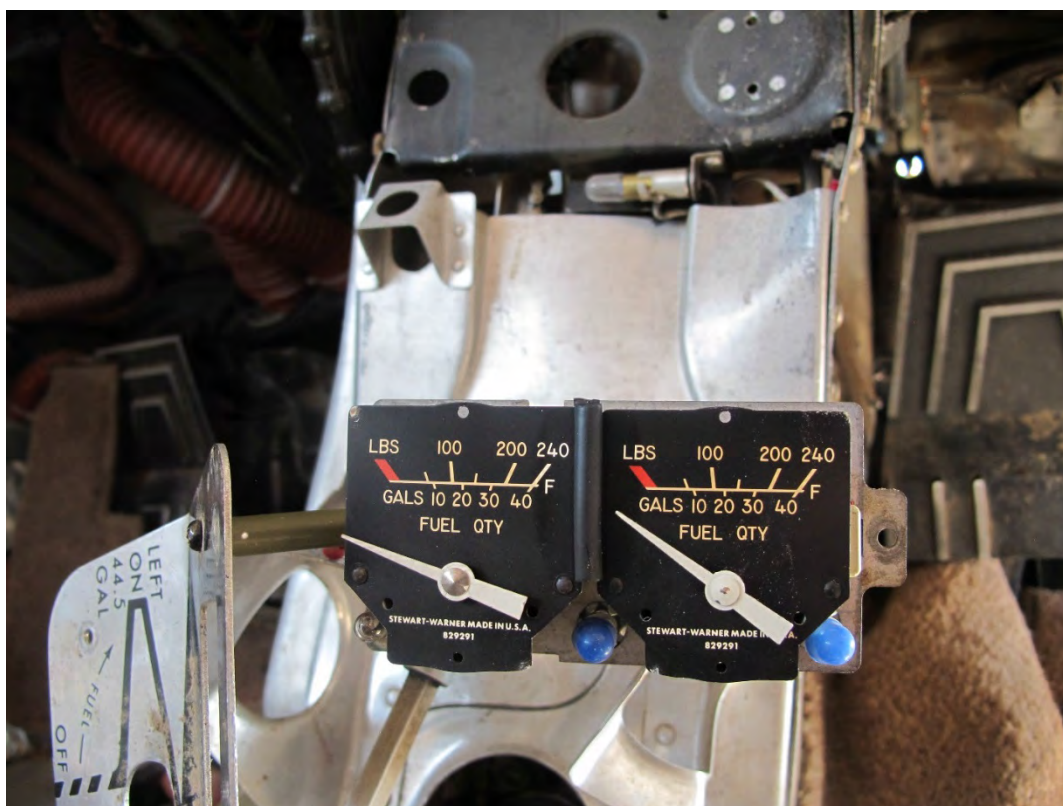


Photo 3 Fuel Quantity Indicators

With the fuel selector valve in the LEFT position, pressurized shop air was applied to the left forward fuel pick up. Air could be felt at the rear pickup and at the fuel line going from the fuel strainer to the engine (which had been cut during the aircraft recovery). The fuel selector valve was placed in the OFF position and shop air was applied to the left forward fuel pick up. No air was felt at the fuel line going from the fuel strainer to the engine.

With the fuel selector valve in the RIGHT position pressurized shop air was applied to the right wing forward fuel pick up. Air could be felt at the rear pickup. No air was felt at the fuel line going from the fuel strainer to the engine (which had been cut during the aircraft recovery). The cabin floor inspection panel above the right header tank was removed and the fuel line from the right header tank to the fuel selector valve was observed separated due to impact damage. The

damaged line was removed from the fuel selector valve and the air supply line was connected to the fuel selector valve. Air could then be felt at the fuel line going from the fuel strainer to the engine.

The airframe manufacturer's representative determined that the landing gear was in the up position. The representative measured the flap actuator at 4.2 inches, and reported that this corresponded to the full up position. The elevator trim measured 1.2 inches, which was outside the useable range (1.3 limit).

The gascolator contained no fluid; the screen contained a few small pieces of lint.



Photo 4 Gascolator

The airplane had STC'd fuel fillers that had a flapper valve that had to be pushed out of the way to visually check the fuel level. The finger screens were clean.

2.0 Engine Examination

The engine was a CMI TSIO 520-R, serial number 269863-R. Total time recorded on the engine at the most recent 100-hour inspection was 1,275 hours.



Photo 5 Top of the Engine



Photo 6 Back of Engine



Photo 7 Right Side of Engine

There were no holes in the crankcase or cylinders that indicated a catastrophic failure of the engine.

The engine partially separated from the airframe during the accident sequence, and recovery personnel completed the separation during recovery.

Investigators placed it on a table, and removed the baffling and valve covers. They manually rotated the crankshaft with a tool on the propeller flange. The crankshaft rotated freely, and the valves moved approximately the same amount of lift in firing order. The camshaft gear turned freely, and investigators obtained thumb compression on all cylinders in firing order.

Investigators removed the spark plugs; all center electrodes were elliptical with no mechanical deformation. All plugs were clean except the bottom left side plugs for cylinders two, four, and six, which were oily; the engine lay canted on its left side during storage. The spark plug electrodes were gray, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart.



Photo 8 Spark Plugs for Cylinders One, Three, and Five



Photo 9 Spark Plugs for Cylinders Two, Four, and Six

A borescope inspection revealed no mechanical deformation on the valves, cylinder walls, or internal cylinder head.

Investigators connected the ignition harness to the spark plugs, and manually rotated the propeller flange. Both magnetos produced spark at all spark plugs in firing order.

Investigators cut open the oil filter, and the filter element was clean.

The fuel nozzles were open.

About 1/2 ounce of a clear light blue fluid remained in the fuel pump. The fuel pump's rubber diaphragm was unbroken. The engine driven fuel pump drive gear was undamaged, and the pump rotated freely.

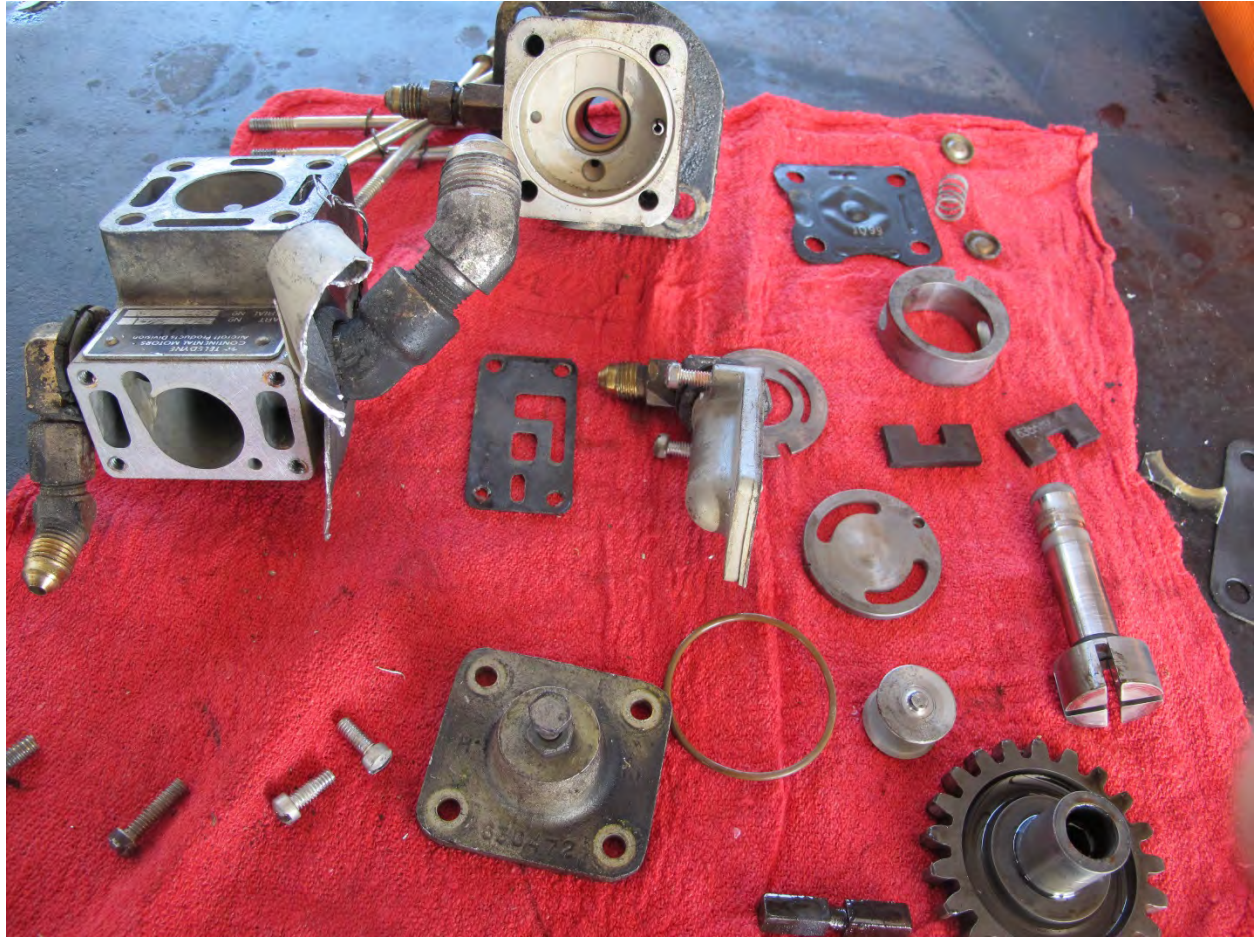


Photo 10 Fuel Pump

The throttle and metering assembly screen contained lint on an estimated 5 % of the screen.



Photo 11 Fuel Metering Unit

The fuel manifold valve contained less than 1/2 ounce of a light blue fluid. The rubber diaphragm was intact and pliable. The screen had some debris along a small section, and investigators observed a few drops of blue fluid with some black contamination in the valve.

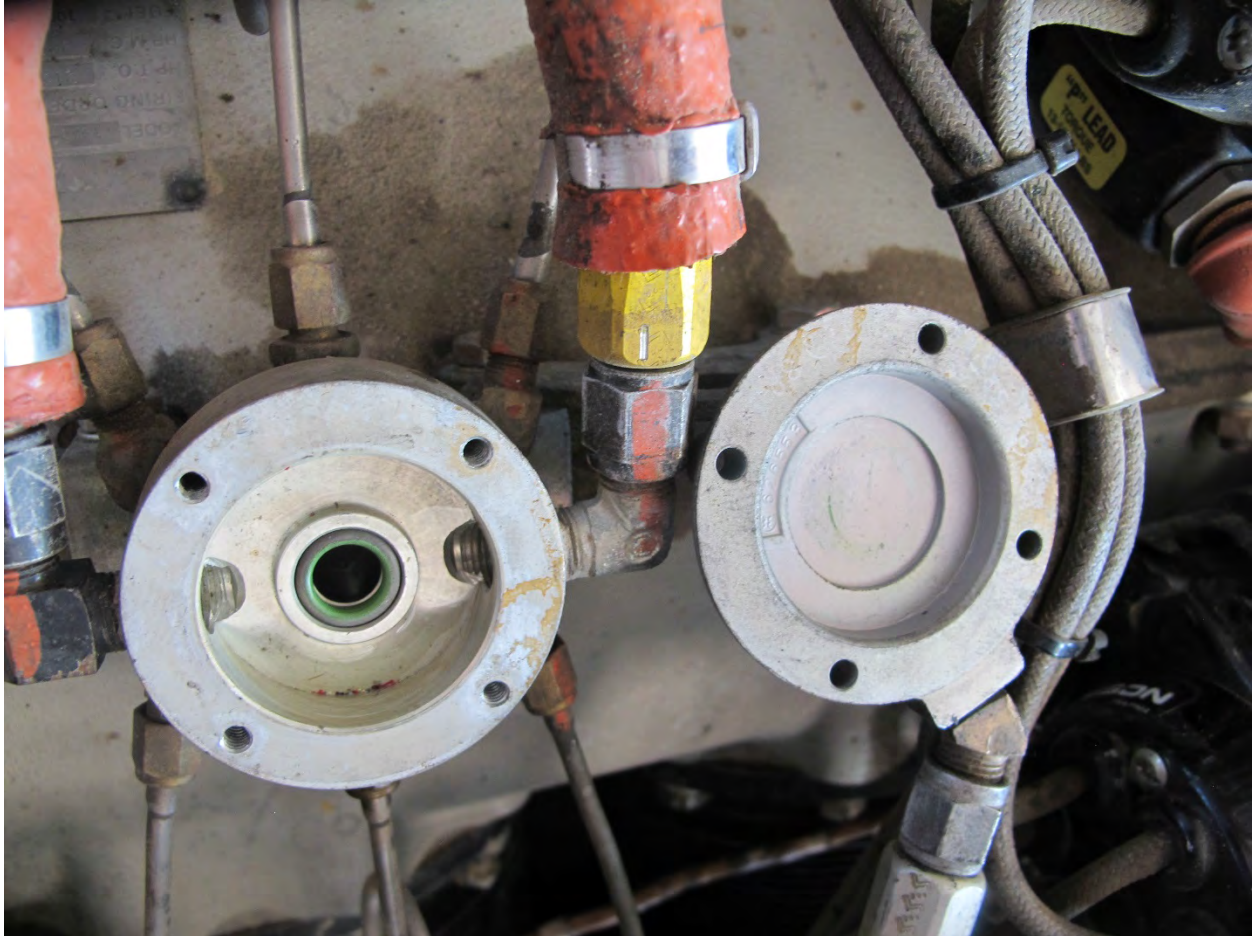


Photo 12 Fuel Manifold Valve



Photo 13 Fuel Manifold Diaphragm



Photo 14 Fuel Manifold Valve Screen

The blades of the compressor and turbine in the turbocharger turned freely, and appeared undamaged.

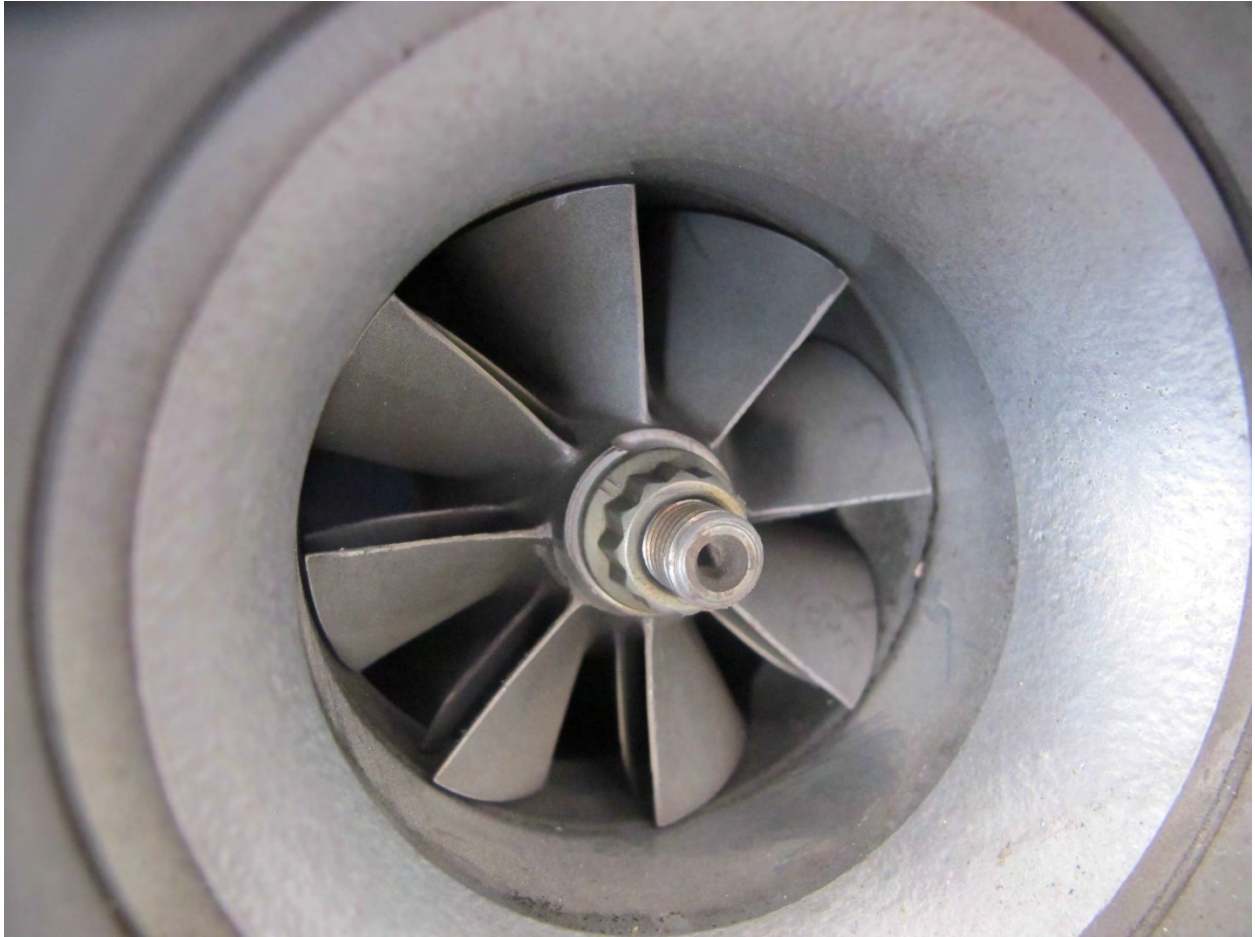


Photo 15 Turbocharger Compressor Blades



Photo 16 Turbocharger Turbine Blades

3.0 Propeller Examination



Photo 17 Propeller

[

The propeller separated from the engine crankshaft at the propeller flange; all the studs were pulled out of the propeller hub. All blades rotated in the hub. The spinner was crushed.

One blade was more damaged than the others; it was bent, twisted, and curled at the tip with severe leading edge gouges.

The outboard fifth of one blade bent aft about 45 degrees, and exhibited leading edge gouges.

The third blade was the least damaged. It had a sweeping aft bend with twist toward low pitch.