



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

June 11, 2018

ENGINE EXAMINATION

ERA18LA103

A. ACCIDENT EXAM

Location: Continental Motors, Inc
Date: Week of June 4th, 2018
Aircraft/Case: ERA18LA103
NTSB IIC: Eric Alleyne

B. ENGINE EXAMINATION PARTICIPANTS:

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C. SUMMARY

The pilot reported that the airplane was flown earlier for about 2 hours, and no problems were noted. For the second flight, after an airplane preflight and engine start, he waited for about 5 minutes for a camera system to boot up. He departed the runway; during the climb the pilot noted that was something wrong with the engine, although it continued to produce power. He checked the instruments and gauges, but did not see any abnormalities. When the airplane reached cruising altitude, the pilot reduced power and the engine lost power.

The engine was separated from the airframe and shipped to Continental Motors, Inc for examination/engine run. The engine is a six-cylinder Continental TSIO-520 engine.

D. DETAILS OF THE INVESTIGATION

1.1 Exam Photos



Overall condition of the engine, when the shipping crate was opened.

Exhaust/turbo components were separated from the engine and was in the shipping crate.



Engine identification examination tag



In order to accommodate an engine run, the following items were removed/corrected.

The engine intake/plenum system was removed

The #6 cylinder valve cover was replaced.

The engine's cooling baffling was removed

#4 bottom ignition lead was repaired



Vacuum pump, alternator, propeller governor were removed

Engine oil was drained; water was observed in the oil

It was also noted that the back of the engine, (damage to throttle bracket and a pulley, etc), had sustained an impact.



The left side induction tube (connected to the throttle body) was replaced.

Piping to the turbo was installed along with a SCAT tube to the throttle body. The turbo pressure relief valve ("pop off" valve) and tubing was not installed, due to damage to the tubing.

Several additional lines, such as fuel, oil lines were connected to the engine

The exhaust stack on the right side was loose, it was assumed this was done during engine removal from the airframe. The exhaust pipes received impact damage, and a small hole in the pipe, on the left-front side was plugged with JB weld.



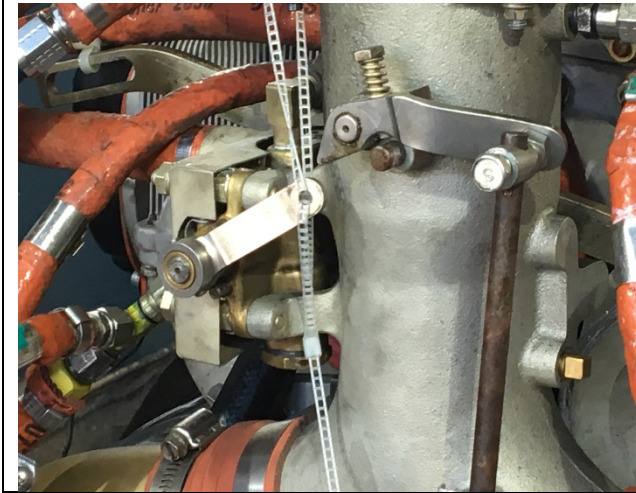
The top set of sparkplugs were removed, the plugs had a black color to them; however, it was noted that the engine was run after the accident and prior to the exam/run at CMI.

A cold compression test was done:

21/59/9/25/58/35

After the engine run the compression test was redone, with a “hot” engine

65/65/59/66/70/74



The mixture control was initially “wired” to the full rich position, for the test.

As tested the engine timing was set at 23 degrees. (timing per dataplate is 20 degrees)



A fix-pitch, test propeller was installed on the engine, and the engine was placed in an engine test cell.



During the set-up it was noted that a fuel and oil were leaking from the engine. A fuel line was replaced, along with valve cover/gaskets.

However, a slight oil leak remained during the test. The oil leak was attributed to impact damage during the accident.



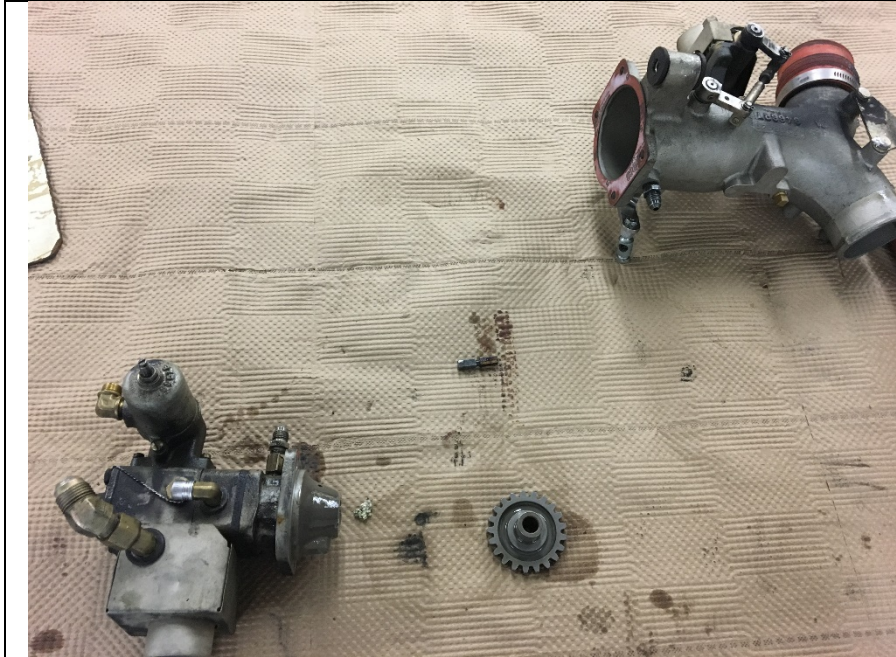
Engine during test run.

The engine started and was run through a series of test points.

The engine would not run to full power settings; the engine appeared to be running too rich. Though the engine would not produce full power, the engine did not "quit".

The fuel pump was adjusted (4 turns – lean) additionally, the propeller pitch was reduced by 1 degree.

The test was resumed and the high power test points were successful.



After the test run, the throttle body and fuel pump were bench tested; the units failed to meet production standards for both units.



The aneroid on the accident engine fuel pump is compared to an exemplar unit.

The engine's fuel mixture was overly rich at high power settings, however, a reason why the engine performed satisfactory on previous flights, but lost power on the accident flight was not determined.