



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

December 17-19, 2018

ENGINE EXAMINATION – CONTINENTAL MOTORS

WPR18FA219

This document contains 7 embedded photos.

A. ACCIDENT

Location: Sylmar, CA
Date: August 12, 2018
Aircraft: Beech A36TC, Registration N136RM, Serial #EA-97
NTSB IIC: Samantha Link

B. EXAMINATION PARTICIPANTS:

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C. SUMMARY

Examination of the engine was conducted on December 17-19, 2018 at the facilities of Continental Motors, Mobile, Alabama. Due to the impact related damage, the engine was unable to be run. A teardown of the engine revealed no pre-accident anomalies that would have precluded the production of rated power.

D. DETAILS OF THE INVESTIGATION

1.0 Engine Examination

- The intake and exhaust systems were heavily damaged.
- The alternator was removed, and the drive coupling and alternator face gear were intact and undamaged.
- The propeller governor was removed from the engine
 - The drive gear was oiled and undamaged.
 - The drive was manually rotated and residual oil pumped from the governor

- The crankshaft was fractured aft of the propeller flange and it was out of alignment
- The spark plugs were removed and exhibited normal operating signatures
 - Upper spark plugs #4 and #6 exhibited dirt consistent with the accident site.
 - Lower Spark plugs #1, #2, #4, and #6 exhibited dirt consistent with the accident site.
- The cylinders were removed and exhibited normal operating signatures
 - The piston heads exhibited normal operating signatures
- The turbocharger was removed, and the impeller housing exhibited no scoring
- The push rods were removed and unremarkable
- The lifters were removed and exhibited normal signatures
- The oil sump was removed
 - A small chunk of fractured metal and a small metal ring were observed.
 - The small chunk of metal was matched with the impact fractured magneto flange.
 - The origin of the metal ring was undetermined.
- The fuel pump:
 - The fuel pump sustained impact damage and a fitting was fractured. While attempting to remove the fractured fitting, the housing to the fuel pump fractured which prevented the pump from being tested on a bench.
 - The pump was disassembled, and all components exhibited normal operating signatures.
- The crankcase was split and the crankshaft, camshaft, piston arms, journals, were all oily and exhibited no abnormal or thermal signatures
 - The main bearing in journal #2 on the 2, 4, 6 side exhibited some wear on the bearing, consistent with fatigue disintegration. There was no corresponding wear on the crankshaft.
 - Some small environmental debris was noted inside the case.
 - The camshaft lobes exhibited normal operating wear signatures
- Oil filter was removed and opened
 - There was no debris.
- The magnetos were installed onto a test bench and produced a strong spark at various RPMs over a 7 mm gap.
- The arm between the waste gate actuator and the valve was bound due to impact damage.
 - The arm was disconnected and, when air was applied, the actuator moved freely from stop to stop.

- The throttle body/fuel metering unit was functionally tested; it was within production specifications with the exception of the idle and full throttle settings. However, these can be attributed with infield adjustments.
- The fuel manifold was functionally tested. It did not meet production standards, but performed closely to the new production parameter flow test curve.
- The throttle arm fracture was examined under a microscope and it was consistent with bending and overload.

1.1 Engine Photos



Figure 1: Spark Plugs

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Figure 2: The Crankshaft and Propeller Flange



Figure 3: The Removed Cylinders

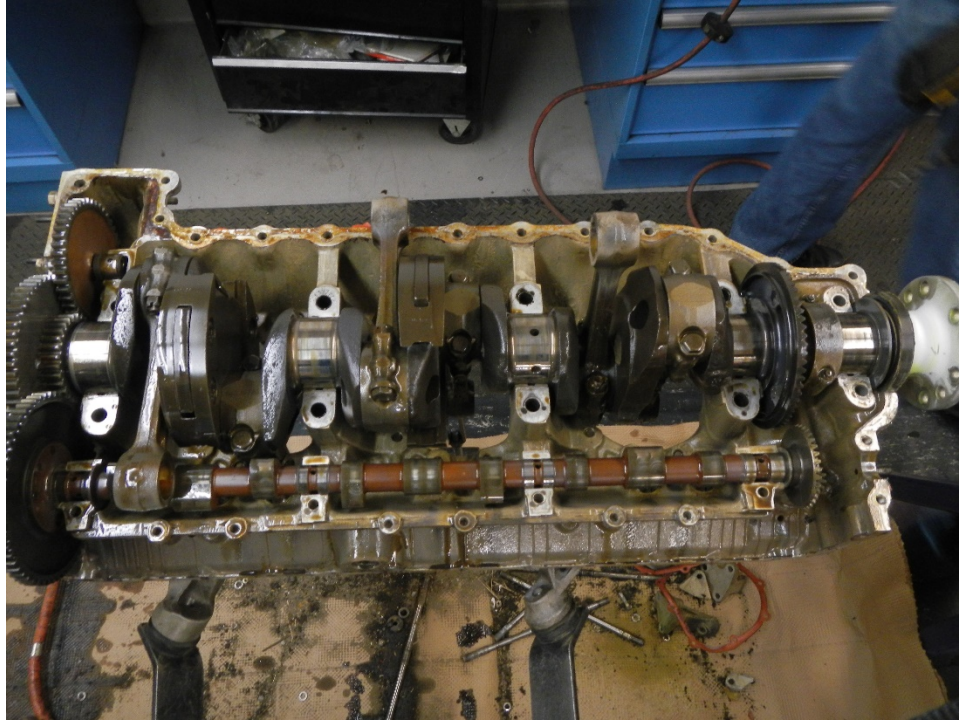


Figure 4: The Split Case



Figure 5: Camshaft



Figure 6: Crankshaft and Bearing Wear

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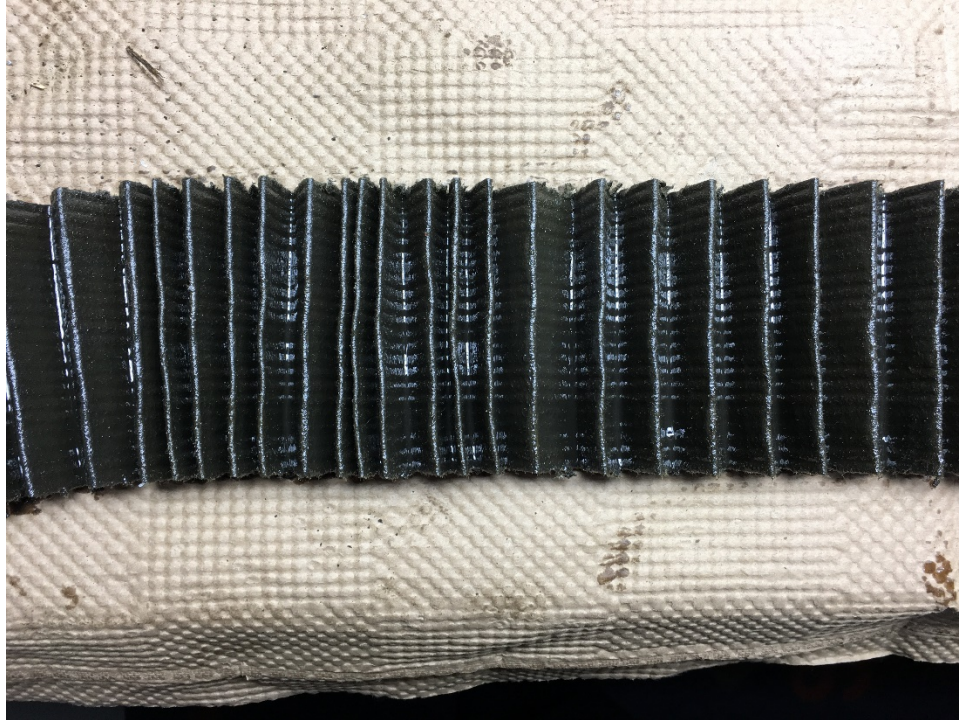


Figure 7: Oil Filter

END.

Submitted by: Samantha Link