



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

April 20-21, 2017

ENGINE EXAMINATION AND RUN

WPR17FA035

This document contains 11 embedded photos.

A. ACCIDENT

Location: Carson City, NV
Date: December 12, 2016
Aircraft: Bellanca 17-30A, Registration #39894, Serial #73-30544
NTSB IIC: Samantha Link

B. EXAMINATION PARTICIPANTS:

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C. SUMMARY

Examination of the engine was conducted on April 20-21, 2017 at the facilities of the Continental Motors in Mobile, Alabama. A significant amount of corrosion was noted in the fuel manifold valve.

D. DETAILS OF THE INVESTIGATION

1.0 Engine Examination

- The engine was removed from the crate and three new engine mounts were added (The fourth mount was still intact)

- It was observed that one of the clamps for the intake tubes between the #4 and #6 cylinders was missing
 - There was dirt on that intake hose similar to what was on the tubes. There were no breaks in the dirt that resembled the shape of the clamp.
 - It was noted that the intake hose was bright orange whereas the other intake hoses were blue.
- A hole was observed in the bottom of the intake tube between the #3 and #5 cylinders
 - New intake tube was installed to facilitate an engine run
- The baffling, spark plugs, alternator, throttle body, oil pan, oil pick-up tube and screen were removed.
 - Alternator rotated freely
 - The oil pan sustained crush damage.
 - The inside of the engine was oiled and showed no evidence of heat distress.
 - A new oil pan and oil pick-up tube and screen was installed onto the engine to facilitate an engine run
- Propeller governor removed and oil pumped out when rotated by hand
- Vacuum pump removed and it rotated freely
 - When rotated by hand, air was pumped out
- The timing of the magnetos were checked and they were found 25 degrees before top/dead center.
 - Note: Continental specifications indicate 22 degrees before top/dead center + or – one degree.
- A cold compression test was completed with leaks coming from the exhaust
 - Cylinder 1: 55/80
 - Cylinder 2: 37/80
 - Cylinder 3: 18/80
 - Cylinder 4: 61/80
 - Cylinder 5: 58/80
 - Cylinder 6: 15/80
- The engine was borescoped
 - The cylinders, exhaust, and intake valves all exhibited normal wear signatures
- Engine Run
 - The engine started normally and without issue
 - As the engine was warming up, at about 1,200 RPM, unexpectedly the test cell building lost power for a few seconds, the engine slowed and

when the building power was returned, the engine sped back up and continued as expected

- o The engine was increased to about 2,100 RPM and the engine ran inconsistently for about 30 seconds before it stabilized.
 - It was noted that while the engine was running inconsistently, the fuel pump pressure was fluctuating.
- o A magneto check was conducted with the engine at 2,100 RPM and no abnormalities were noted
- o The engine was increased to about 2,400 RPM momentarily then increased to full power and it operated normally
- o The engine power was abruptly changed from idle to full power, and full power to idle four times with no anomalies noted
- o A second magneto check was conducted with the engine at 2,100 RPM and no abnormalities were noted.
- A hot compression test was completed with leaks from the exhaust
 - o Cylinder 1: 62/80
 - o Cylinder 2: 58/80
 - o Cylinder 3: 75/80
 - o Cylinder 4: 49/80
 - o Cylinder 5: 79/80
 - o Cylinder 6: 60/80
 - o Master orifice reading 43
- The fuel components were removed for further examination.
- The throttle body was removed and disassembled
 - o Fuel screen was removed and a few specks of debris were noted, but the screen remained clean
 - o The metering unit was disassembled and no anomalies were noted
- The fuel manifold valve was disassembled
 - o The screen and lower housing of the manifold valve exhibited rust indicative of corrosion
 - o The lower portion of the plunger also exhibited rust indicative of corrosion
 - o The diaphragm was removed and a small amount of fuel was found on the “dry” side of the valve. The vent extending from this section was examined and clear of debris.
- The fuel pump was disassembled
 - o The pump drive and veins were removed and intact. There was a very small amount of rust on the fuel pump drive.

- o The drive coupling was intact
 - o No anomalies were noted
- The nozzles were removed from the engine and were clear of debris

1.1 Photos



Figure 1: Engine After Unboxing

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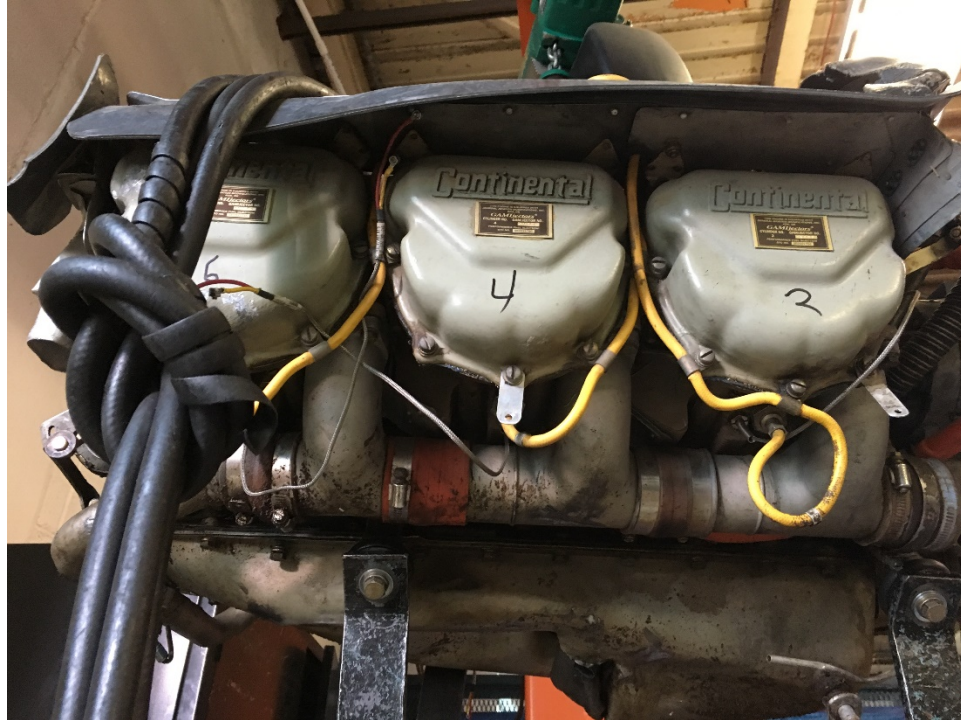


Figure 2: Missing Clamp

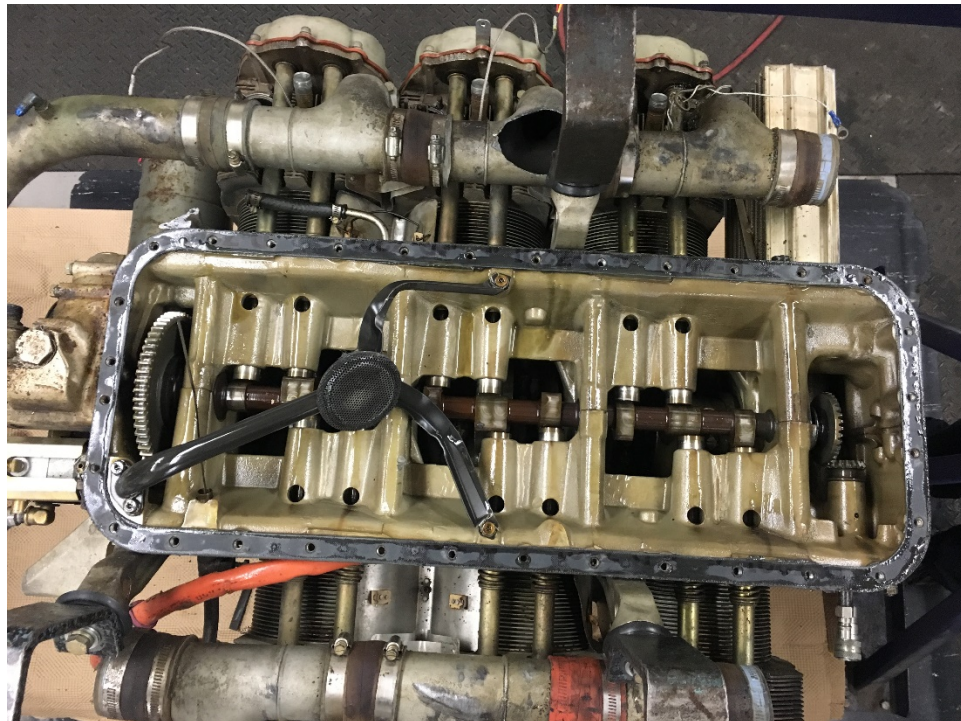


Figure 3: Inside of the Engine from Bottom



Figure 4: Oil Sump



Figure 5: The Engine Installed onto Test Cell



Figure 6: Throttle Body Fuel Screen

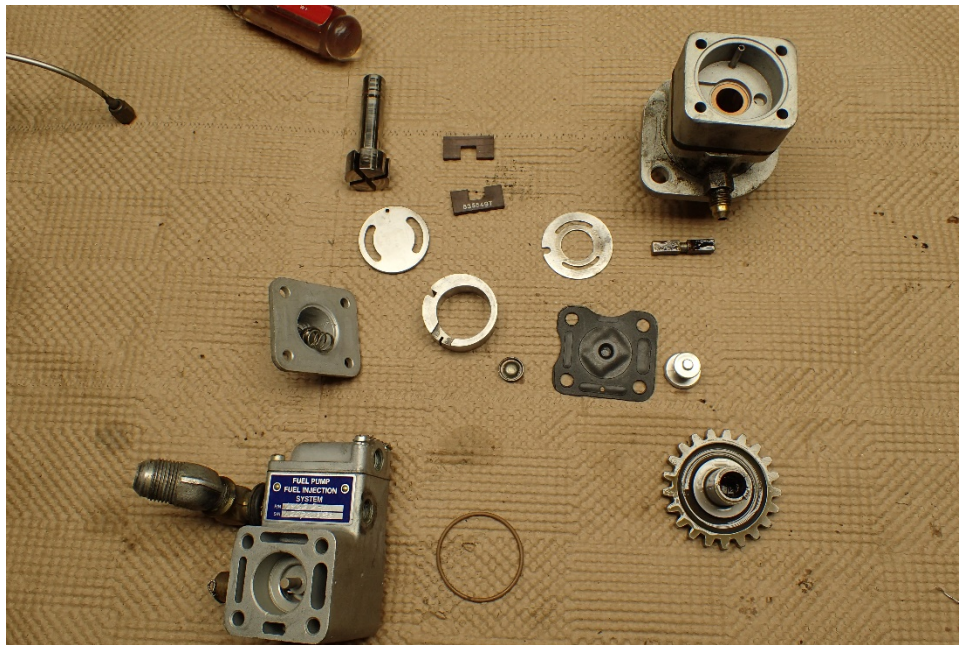


Figure 7: Fuel Pump Disassembled



Figure 8: Fuel Manifold Valve



Figure 9: Fuel Manifold Valve Lower Housing

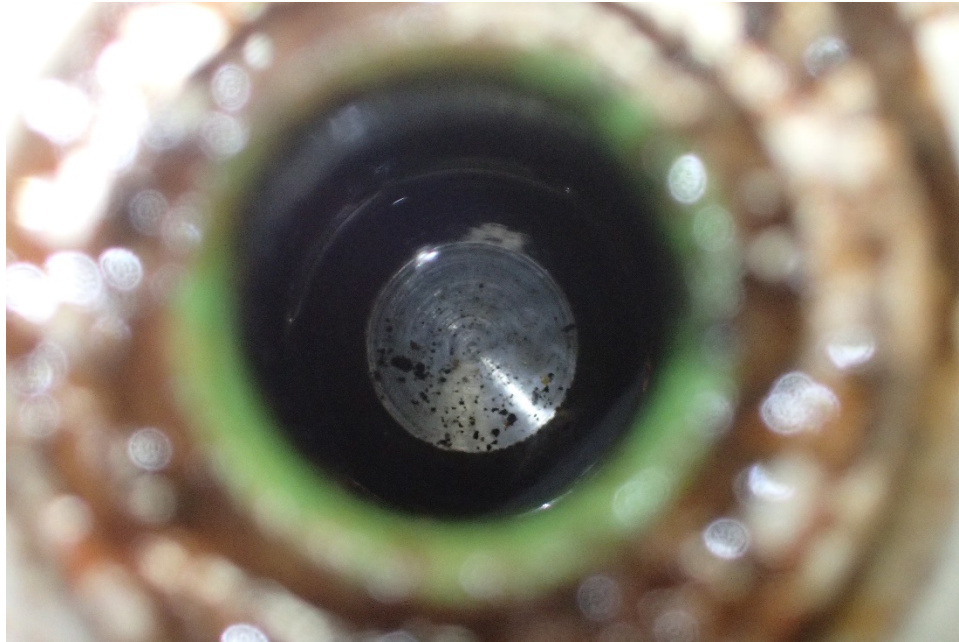


Figure 10: Manifold Valve Plunger Housing



Figure 11: Manifold Valve "Dry" Section

Submitted by: Samantha Link