



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

September 12, 2017

AIRFRAME AND ENGINE EXAMINATION

WPR17FA200

A. ACCIDENT

Location: Benicia, CA
Date: September 9, 2017
Aircraft: Registration Number: N7215J, Raytheon Aircraft Company G36,
NTSB IIC: Albert Nixon

B. EXAMINATION PARTICIPANTS:

Albert Nixon
Aviation Accident Investigator
National Transportation Safety Board
Federal Way, WA

Matthew DeSeelhorst
Aviation Safety Inspector
Federal Aviation Administration
Oakland, CA

Michael Council
Air Safety Investigator
Continental Motors Inc.
Mobile, AL

Peter Basile
Air Safety Investigator
Textron Aviation
Wichita, KS

C. SUMMARY

Examination of the airplane's airframe and engine was conducted on September 12, 2017, at the facilities of Plain Parts, Pleasant Grove, California. No anomalies or evidence of preimpact mechanical failure or malfunction were noted during the examination of the recovered airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

Examination of the airplane revealed that the wings were removed for recovery. The fuselage was previously cut from about 2 ft forward of the vertical stabilizer's leading edge and the cabin roof was removed.

The wings sustained leading edge impact damage for the entire span. The leading-edge wing skins had separated.



Figure 1: Right wing as viewed from the front.

Flight control continuity was established from the ailerons to the wing root. Additionally, rudder and elevator continuity were established.

The left flap and aileron were attached at all their respective attachment points. The left flap was split about mid-span. The left tip tank front and bottom were crushed at about the impact angle.

The right flap and aileron were attached at all their respective attachment points. The right tip tank front and bottom were crushed at about the impact angle.

The vertical stabilizer was wrinkled, and the rudder was attached with the trim observed slightly right. The left horizontal stabilizer was relatively intact. The right horizontal stabilizer sustained wrinkling and the tip was bent upwards. The left and right elevator trim was observed to be about 2-3° tab up.

In the cabin, the G-1000 PFD and MFD were destroyed.

The fuel selector was selected to the left tank. The fuel selector case sustained damage and was removed and examined. The valve was determined to be selected to the left tank and no

obstructions were observed. The fuel strainer gasket sustained damage but the screen and bowl were clear of contaminants.

An airplane invoice for fuel service indicated that the airplane was refueled for 31.5 gallons on the day of the accident.

2.0 Engine Examination

Examination of the Continental IO-550B-39B engine, that was modified by an aftermarket installation of a Tornado Alley Turbo Inc., turbonormalizing system covered under STC SA5223NM, revealed that the engine sustained impact damage that fractured all the engine mounts. The forward crankcase material sustained impact damage and large portions were separated. A large hole in the top portion of the right crankcase was observed between cylinders nos. 1 and 3. Inside the opening, crankcase material could be observed, and the crankshaft rotating components including connecting rods and counterweights were intact. The top aft portion of the crankcase had separated below the magneto mounts. Additionally, cylinders nos. 1 and 3 sustained substantial impact damage to their cooling fins and cylinder no. 1 valve rocker cover had separated.

All valve rocker covers were removed, and examination revealed that all intake and exhaust rocker arms, shafts, and valve springs, were intact with no anomalies observed. The crankshaft was unable to be rotated by hand, due to impact damage to the lower crankcase, engine oil sump, and the accessories. A borescope inspection of the cylinders revealed evidence of normal operational conditions.

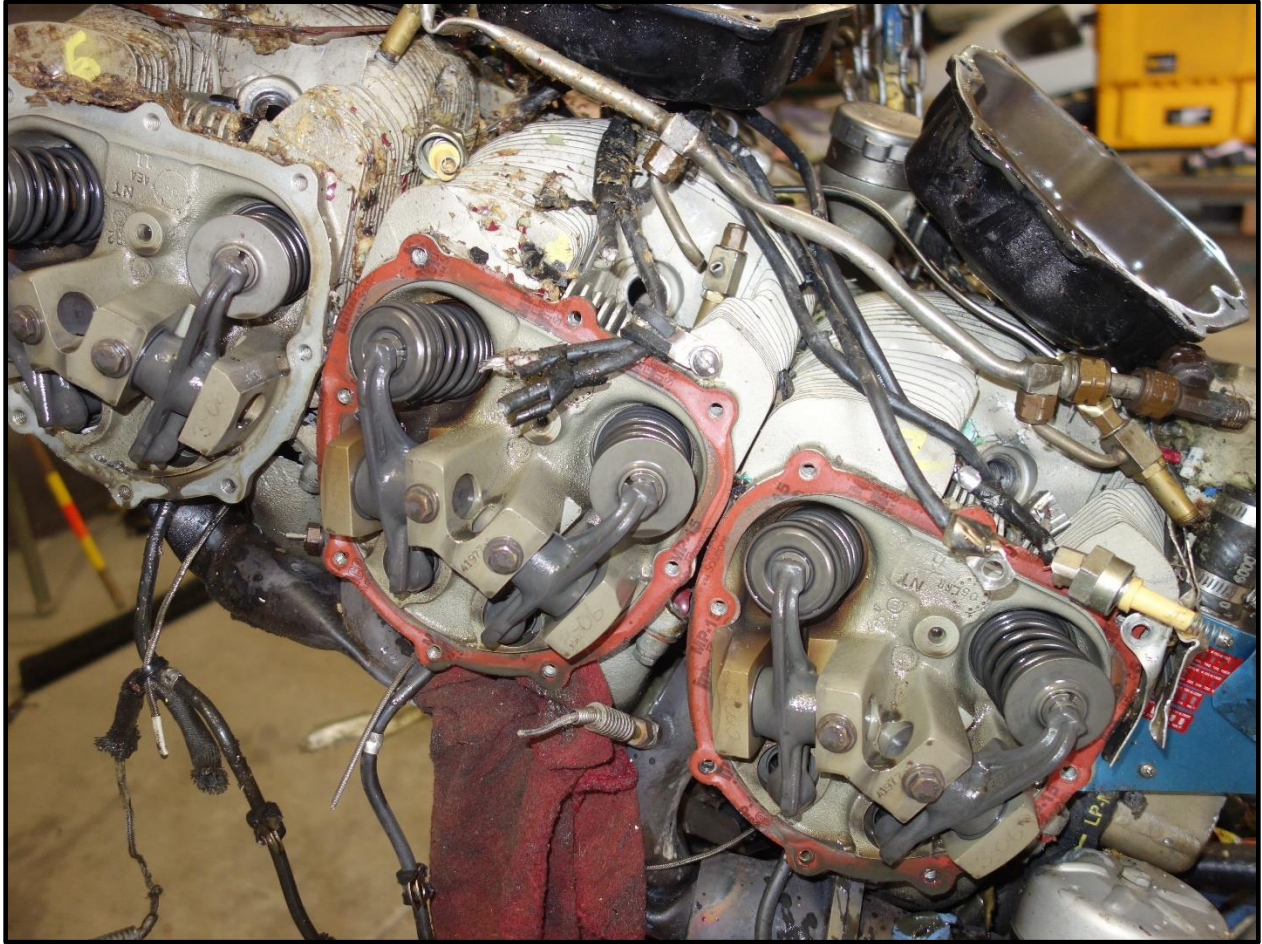


Figure 2: Engine as viewed from the right side.

All the engine accessories mounted to the rear of the engine sustained impact damage. The left magneto had separated but remained attached through the damaged ignition harness. The right magneto had also separated but was located in the wreckage. The started adapter, starter motor, and engine driven fuel pump, sustained impact damage. Further, the accessory gearing sustained impact damage.

The left magneto external case and mounting collar sustained impact damage. The left magneto was manually rotated by a drill motor and spark was produced at all ignition leads. The right magneto was manually rotated by a drill motor, but no spark was produced. The right magneto was removed for examination. Examination of the right magneto revealed that its external case was cracked, and the pinion gear was damaged with several of the teeth missing on both sides of the gear.

The oil pump, oil cooler, oil filter, and oil sump sustained impact damage. The oil pump was removed and examined. Examination revealed that the internal gear teeth had no indication of hard particle passage. The oil filter was opened, and examination of the filter revealed no metal contamination. The fuel system throttle body was forced upward through the oil sump. Examination of the oil sump revealed that it was compromised when the throttle body was forced upward from the impact.

The top sparkplugs were removed, and the cylinder's nos. 1 and 2 sparkplugs were impact damaged. The spark plugs electrodes exhibited "worn out to normal" wear signatures when compared to the Champion Check-A-Plug comparison chart, with the exception of the no. 1 spark plug which the electrode had separated.

The engine driven fuel pump was removed and examined. The drive coupling was intact and when rotated by hand, the drive shaft rotated freely. No fuel was expelled when the pump was rotated. The mixture aneroid and the unmetered fuel pressure adjustment bolt and locknut were impact damaged. The pump was disassembled, and the vanes were intact and there were no signs of contamination.

The fuel manifold separated at its mount but remained attached by the fuel lines. The manifold was intact and secured with the appropriate safety wire, but the fuel lines were impact damaged. The fuel injectors were impact damaged at their respective cylinder head.

The examination of the engine revealed no evidence of pre-impact mechanical anomalies or malfunctions that would have precluded normal operation.

Submitted by: Albert Nixon