



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

ENGINE COMPONENTS EXAMINATION

WPR16FA178

This document contains zero embedded photos.

A. ACCIDENT

Location: Reno, Nevada
Date: September 11, 2016.
Aircraft: Piper PA-28R-201T, Registration N821ET
NTSB IIC: Elliott Simpson

B. EXAMINATION PARTICIPANTS:

Elliott Simpson
Senior Aviation Accident Investigator
National Transportation Safety Board
Los Angeles, CA

Kurt Gibson
Air Safety Investigator
Continental Motors Group
Mobile, Alabama

Phillip Grice
Manager of Product Field Performance
Continental Motors Group
Mobile, Alabama

C. SUMMARY

Examination of the engine components was conducted at the facilities of Continental Motors Group Mobile, Alabama, on February 27, 2018.

D. DETAILS OF THE INVESTIGATION

1.0 Examination

Left Magneto

Type: S6LSC-25P
PN: 10-500556-103
SN: D14DA356

Logbook entries indicated that the magneto was installed on the airplane on June 17, 2014 at a tach time of 4355.5 hours. Continental records indicated that the unit was built from new in 2014.

The external case of the magneto appeared undamaged, except for the mounting flange, which had broken away in the two areas adjacent to the hold washers.

The magneto was installed in a test stand and run at shaft speeds from zero through to 2,700 RPM. The impulse coupling triggered, and sparks began to consistently appear in firing order at all output leads at starting at 400 RPM. Sparks were observed through to the highest tested speed of 2,700 RPM.

Right Magneto

Type: S6LSC-25P
PN: 10-500556-103
SN: D1112912

Logbook entries indicated that the magneto was installed on the airplane on December 3, 2012 at a tach time of 4191.68 hours. The records indicated that the unit was rebuilt In November 2019, by Quality Aircraft Accessories, Tulsa, Oklahoma.

The points cover had broken off, exposing the points. No capacitor was present, and examination of the initial examination photos revealed that the capacitor had been crushed. The mounting flange had broken away in the two areas adjacent to the hold washers.

The spring side of the points arm appeared offset by about 2mm.

The points cover and capacitor from the left magneto was installed, and the unit magneto was installed in a test stand and run at shaft speeds from zero through to 2,700 RPM. The impulse coupling triggered, and sparks were observed only at plug outputs 1, 3, and 5.

The bent points arm was then re-aligned, and the unit tested on the stand. The impulse coupling triggered, and sparks began to consistently appear in firing order at all output leads at starting at 400 RPM. Sparks were observed through to the highest tested speed of 2,700 RPM.

Engine Driven Fuel Pump

PN: 649368-26A
SN: B04DA027R

The engine driven fuel pump flange remained attached to crankcase, but the pump had separated. The fuel pump had fragmented, exposing the mixture housing, and separating the input drive shaft and rotor. The mixture control arm and eyebolt fitting remained attached to the pump.

The unit was disassembled and examined. The aneroid was intact, and did not appear to be punctured, and was the same length as an exemplar unit. The rubber diaphragm was intact, and

no cracks were observed. All internal passages were clear, and the inner valve surfaces and chambers were free of corrosion or damage.

The vanes sustained damage and appeared frozen within the rotor head. The rotor shaft was seized on the bearing, and the coupling end exhibited damage which cause it to impinge against the bearing.

Manifold Valve

PN: 641032-11A8

SN: C04DA024R

The manifold valve assembly, including the GAMI injectors and lines were installed in in the flow divider test stand.

The system was run through a calibration test but failed due to low pressure values at the higher flow range. This was presumed to be due to the use of GAMI injectors, so a manual flow versus pressure test was performed with the following results:

Flow (PPH)	Pressure (PSIG)	Min/Max Nominal Pressure (PSIG)
10	3.89	3.54/4.34
50	5.92	5.65/6.45
100	10.62	10.71/11.11
150	17.67	18.22/19.02

According to the Continental representatives, the out of tolerance values at higher pressures could be attributed to the use of GAMI injectors and did not represent a significant discrepancy.

A fluid leak of about 1 drop per second was observed coming from the vent outlet. During the test, all injector's sprayed similar quantities of fuel, with clear flow patterns.

The unit was disassembled and examined. The screen was free of debris, and no damage was noted to any of the internal components. The diaphragm was intact and remained flexible and did not exhibit and cracks or punctures. It's attachment lock was tight; however, the diaphragm could be rotated on the spindle. The diaphragm had a production stamp of 4Q03.

Throttle Body

PN: 6400S63-15A4

SN: A04DA018R

The unit sustained no discernable damage and was installed in a throttle test stand.

Tests were performed checking the fuel pressure and flow rate at various throttle angles, with the following results:

<u>Throttle Angle (°)</u>	<u>Measured Pressure (PSI)</u>	<u>Measured Flow (LBS/H)</u>	<u>(Min/Max Nominal Flow)</u>
2	6.03	14.63	7.3/7.7
8	10.44	34.18	20.0/24.4
24	13.41	70.55	57.0/62.7
48	13.0	111.8	103.0/110.7
74	9.97	117.84	119.0/125.0

Results fell outside of specifications, which, according to the Continental representatives was a result of field adjustments on-engine.

Submitted by: Elliott Simpson