

## **ENGINE TEARDOWN REPORT**

**Engine Model:** Continental IO-550-D 27B

**Engine Serial Number:** 284383-R

**Aircraft Make:** Cessna

**Aircraft Model:** 182-P

**Aircraft Serial Number:** 18263045

**Registration Number:** N430ML

**Date of Examination:** August 26 & 29, 2011

**Requesting FAA Office:** Orlando, Fl. FSDO SO-19

**Accident/Incident Number:** ERA 11 LA 190

**Investigation Party:**

Jack E. Clark---Birmingham, Al. FSDO SO-09

Philip Grice---Continental Motors, Mobile, Al.

**Description of Engine:**

550 cubic inch displacement six cylinder air cooled fuel injected engine, developing 300 horsepower at 2700 RPM.

**Initial Inspection:**

Aircraft engine was located in the Analytical Department at Continental Motors, Mobile, Alabama. The engine was removed from a shipping container and placed on an engine stand.

Valve covers for #2, #3 & #5 cylinders missing. Fuel pump removed from engine and placed loosely on top of engine. No obvious external damage noted. No burn or smoke damage present.

14 quarts of measured oil drained from engine.

**Engine Disassembly:**

- Engine baffling and accessories removed to expedite engine disassembly.
- Starter adapter drive was removed: noting drive gear teeth had accelerated wear on gear face. Visual inspection of internal gearing disclosed one (1) crankshaft gear tooth missing, multiple camshaft gear teeth missing.
- Oil pump assembly was removed and disassembled, noting scoring on pump housing and gears, metal contamination present inside pump housing.
- Oil pressure relief valve has chatter marks of valve face.
- Magnetos removed; noting red RTV under gasket surfaces, left magneto drive gear would not rotate freely, found broken gear tooth wedged between idler gear

and magneto gear. After removal of the gear tooth the magneto drive gears rotated freely.

- Oil sump was removed revealing that the # 1 cylinder exhaust lifter had failed & seized in the lifter boss. #5 cylinder tight in lifter boss—spalling present on all lifter faces with #1 cylinder exhaust lifter being the worse. Lifter part number: exhaust TCM 653877 and intake TCM 653888.
- Excessive wear noted on all camshaft lobes with #1 cylinder being the worst. All lobes had metal turned down over edges as indicated with spalling of the lifters.
- Cylinder pad nuts were checked for torque and break away torque---#3 cylinder: two flange nuts and one through bolt below minimum torque (loose)---all others found satisfactory.
- Cylinders installed ECI AEC65385; removed cylinders: all cylinder bores normal operational appearance with no scoring present. Piston—valve strikes on all piston domes, otherwise normal operational appearance. Rings—normal operational appearance.
- All valves have hammered valve faces: valve key retainer slots had raised edges—sharp: valve tip have mushrooming —sharp.
- Crankcase halves separated with no sign of fretting or deformation.
- Camshaft gear had nine (9) teeth missing and one (1) tooth damaged. Part number 655516(GMI).
- Crankshaft gear had four (4) consecutive teeth missing and one (1) tooth missing from another location: total of five teeth missing from the crankshaft gear. Part number 653631(F).
- Valve lifters were tested for bleed down and were found to be within specifications.
- Cylinder valves to guide measurements---found satisfactory

#### **Accessory Testing:**

Magnetos were tested original engine harness---found satisfactory at 7mm gap.

Fuel metering and throttle body; out of perimeter (low): \*Trash found in fuel screen.

Fuel distributor manifold---pressure low: Nozzles---found satisfactory.

Fuel pump---pressure high.

#### **Added Information/Other:**

Oil filter was opened; filter contains metal particles (steel & aluminum).

14 quarts of measured oil drained from engine.

#### **Causal Factor/ Observations:**

Engine failed due to camshaft gear teeth failure.

Camshaft gear and broken gear teeth were sent to Continental Motors Engineering Department for metallurgical evaluation. Testing revealed no abnormalities with metal composition and meets manufacturer's specifications. No determination was as to the cause of failure of the camshaft gear teeth.

Jack E. Clark  
Aviation Safety Inspector, FSDO SO-09  
October 11, 2011

Enclosures: Photographs one CD.  
Copy of fuel system test (3 pages)  
Copy of Continental Motors Metallurgical Report.