

**ENGINE EXAMINATION REPORT**

**FILE NUMBER:**

**ENGINE S/N:**

**PAGE 2 of 6**

**GENERAL INFORMATION**

EXAMINATION		ACCIDENT DATA	
<b>DATE</b>	January 19, 2016	<b>NTSB ACCIDENT #</b>	CEN15LA298
<b>FACILITY</b>	Continental Motors	<b>NTSB INVESTIGATOR</b>	Tom Latson
<b>ADDRESS</b>	2039 South Broad Street Mobile, Alabama 36615	<b>FAA INVESTIGATOR</b>	Christopher Cotton
		<b>ACCIDENT DATE</b>	July 7, 2015
		<b>ACCIDENT LOCATION</b>	Houston, Texas

**ENGINE INFORMATION**

<b>ENGINE POSITION</b>	Front
<b>TOTAL TIME</b>	Unknown
<b>TIME SOH</b>	Unknown
<b>TYPE &amp; TIME SLI</b>	Unknown
<b>BUILD DATE</b>	April 24, 2014
<b>SHIPPED DATE</b>	May 21, 2014

**Significant logbook information:**

The airframe and engine log books were not recovered during the course of this investigation.

**Report Summary:**

Search Code(s):

The propeller governor was repaired by R&D Propeller Service on July 2, 2015 and reinstalled on the engine prior to the incident flight. Prior examination at Specialized Aero in San Marcos, Texas revealed the propeller governor attaching nuts were rounded off and the washers being improperly stacked.

Upon engine teardown, it was discovered that the camshaft governor drive gear was fractured in half and was located in the oil sump. The governor drive gear teeth exhibited damage consistent with the governor driven gear being misaligned. The propeller governor drive gear teeth also exhibited damage.

**Disposition of engine following exam:**

The engine was shipped to Specialized Aero in San Marcos, Texas.

## Propeller

One blade separated from the propeller near its root and another blade had a dent on its trailing edge near the blade root. The third blade was intact. The spinner had a dent in it.

## TESTS & RESEARCH

### McCauley Examination of the Propeller Governor

The propeller governor was removed from the accident airplane and sent to McCauley Propeller in Columbus, Georgia where it was tested per the Acceptance Test Procedure (ATP) located in Appendix M of this report. The test was conducted on September 24, 2015.

Personnel present were:

Name	Organization
Mell Tolle	FAA MIDO
John Wuellner	McCauley
Dawn Tyler	McCauley
Brad Miller	Cirrus Aircraft

According to an email from John Wuellner, the following observations were made during the initial visual inspection of the governor:

- B-20159 gasket was used between top cover and governor body
  - B-20862 is the correct part number gasket
  - Dimensionally the gaskets are similar except B-21059 has cutouts for feathering governor applications
  - This condition did not appear to have affected the gaskets ability to seal or the governors ability to function
- B-20040 torsion spring on the exterior of the governor was not connected to the A20609 control arm
  - Purpose of spring is to provide positive pressure towards low RPM
  - RPM limits of governor would remain unchanged because of this condition
  - This condition (spring not attached) may have been caused by: removal of the governor and/or shipping.
  - Photo taken previously may show whether it was connected properly while installed on the accident airplane
- One of the six A-1635-84 top cover screws showed no evidence of having a Loc-Wel patch
  - The screw did have applied torque and as such would have functioned properly
- The C-20959 top cover was at a previous revision
  - There is no requirement to install latest revision

The evaluation results provided by McCauley showed the tested and recorded parameters for the governor were all within their specified values per the paperwork provided.



## Hartzell Examination of the Propeller

The propeller was examined by Les Doud, air safety investigator for Hartzell propellers. The following is the summary and analysis of findings section from his report which is located in Appendix M.

*The onboard recorded data from this accident indicated the engine/propeller experienced an overspeed in excess of 3600 RPM (range limit of sensor) during the initial climb. The propeller governor was subsequently checked at the manufacturer (McCauley) and found to be serviceable. A propeller teardown examination was then conducted to search for indications of a propeller overspeed and its possible cause. Exterior damage to the propeller included: one blade fractured, another dented, and the spinner dome exhibited a dent consistent with ground impact at zero rotation. There was fretting damage on the engine/propeller mounting flanges consistent with an overspeed event.*

*The propeller teardown confirmed no engine oil present on the aft side of the piston or internal to the hub, therefore there were no indications of a propeller seal failure that could have contributed to an overspeed event.*

*After the propeller exam, the participants examined the propeller governor drive shaft and discovered it did not rotate with crankshaft rotation. If the propeller governor was not being driven by the engine, this would result in insufficient oil pressure to the propeller and an engine overspeed. Additionally, the propeller governor drive shaft could be moved in and out of the shaft bore by finger force, implying it was not secured within the engine. Also, the face of the propeller governor drive shaft was damaged indicating rubbing wear between the propeller governor drive shaft and governor coupling shaft. An inspection of the engine was being planned at a later date to investigate the propeller governor drive shaft connection.*

Mr. Doud's report stated the following in its conclusion:

*There were no discrepancies noted on the propeller that would prevent or degrade normal operation. All damage was consistent with an engine overspeed event and ground impact with no rotation after engine shutdown.*

## Continental Motors Engine Exam

The engine was sent to Continental Motors facility in Mobile, AL for further examination. As of the date of this report the Continental Motors examination report has not been received. It is understood that they found damage to the engine consistent with the propeller governor being forcefully installed which caused damage to the governor's drive system. This finding is consistent with Hartzell's analysis above.

