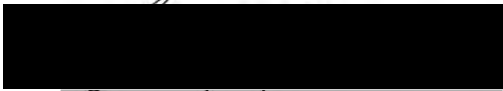




# Continental Motors

## ENGINE EXAMINATION REPORT

|                        |             |
|------------------------|-------------|
| ENGINE MODEL           | IO-550-A3B  |
| ENGINE SERIAL NUMBER   | 1005713     |
| AIRCRAFT MAKE & MODEL  | Cessna 310R |
| AIRCRAFT SERIAL NUMBER | 310R0164    |
| AIRCRAFT REGISTRATION  | N5044J      |
| FILE NUMBER            | 18-286      |

| NAME              | SIGNATURE                                                                            | DATE       |
|-------------------|--------------------------------------------------------------------------------------|------------|
| Nicole L. Charnon |  | 04/01/2019 |

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**PAGE 2 of 29****GENERAL INFORMATION**

| <b>EXAMINATION</b> |                                                | <b>ACCIDENT DATA</b>     |                  |
|--------------------|------------------------------------------------|--------------------------|------------------|
| <b>DATE</b>        | 03/19/2019                                     | <b>NTSB ACCIDENT #</b>   | ERA19FA039       |
| <b>FACILITY</b>    | Anglin Aircraft Recovery & Storage             | <b>NTSB INVESTIGATOR</b> | Adam Gerhardt    |
| <b>ADDRESS</b>     | 4901 Holletts Corner Road<br>Clayton, DE 19938 | <b>FAA INVESTIGATOR</b>  | Scott Gillson    |
|                    |                                                | <b>ACCIDENT DATE</b>     | 11/09/2018       |
|                    |                                                | <b>ACCIDENT LOCATION</b> | Walton, New York |

**ENGINE INFORMATION**

|                            |                                                  |
|----------------------------|--------------------------------------------------|
| <b>ENGINE POSITION</b>     | Left Engine                                      |
| <b>TOTAL TIME</b>          | 572.5 hours at last Annual Inspection 08/21/2018 |
| <b>TIME SOH</b>            | N/A                                              |
| <b>TYPE &amp; TIME SLI</b> | Unknown. Annual Inspection 08/21/2018            |
| <b>BUILD DATE</b>          | 11/28/2011                                       |
| <b>IN SERVICE DATE</b>     | Unknown                                          |

**Significant logbook information:**

The aircraft maintenance records were kept in the accident airplane and portions were found by the on-site investigative group. Copies of the last annual inspection were provided by the maintenance outfit that conducted the inspection. According to that paperwork the last annual inspection took place on August 21, 2018 at an engine total time of 572.5 hours. During the annual inspection the magnetos were replaced and the oil filter was changed. The old oil filter was cut open for inspection with no anomalies noted.

The engine total time at the time of the accident is unknown. An oil filter belonging to the left engine was found in the debris. A date of 09/27/2018 was hand-written on the side of the filter. The tach time written on the side of the filter was not legible due to the impact damage.

**Report Summary:**

Search Code(s):

15-12-68

The engine sustained significant impact-related damage that precluded the functional testing of many of the components. However, examination of the engine and engine-related systems did not reveal any pre-accident anomalies that would have precluded its ability to produce full, rated power.

**Disposition of engine following exam:**

The engine and its related components were stored at the aircraft recovery facility pending final release by the NTSB investigator-in-charge (IIC).

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|                     |                      |                     |                       |
|---------------------|----------------------|---------------------|-----------------------|
| <b>NAME</b>         | Nicole Charnon       | <b>NAME</b>         | Adam Gerhardt         |
| <b>ADDRESS</b>      | Washington, DC       | <b>ADDRESS</b>      | Ashburn, VA           |
| <b>ORGANIZATION</b> | Continental Motors   | <b>ORGANIZATION</b> | NTSB – Eastern Region |
| <b>PHONE</b>        | [REDACTED]           | <b>PHONE</b>        | [REDACTED]            |
|                     |                      |                     |                       |
| <b>NAME</b>         | Peter Wentz          | <b>NAME</b>         | Jennifer Barclay      |
| <b>ADDRESS</b>      | Ashburn, VA          | <b>ADDRESS</b>      | Wichita, KS           |
| <b>ORGANIZATION</b> | NTSB – Easter Region | <b>ORGANIZATION</b> | Textron Aviation      |
| <b>PHONE</b>        | [REDACTED]           | <b>PHONE</b>        | [REDACTED]            |
|                     |                      |                     |                       |
| <b>NAME</b>         | Nancy McAtee         | <b>NAME</b>         | Adam Huray            |
| <b>ADDRESS</b>      | Washington, DC       | <b>ADDRESS</b>      | Washington, DC        |
| <b>ORGANIZATION</b> | NTSB                 | <b>ORGANIZATION</b> | NTSB                  |
| <b>PHONE</b>        | [REDACTED]           | <b>PHONE</b>        | [REDACTED]            |

**EXTERNAL ENGINE CONDITION**

The engine was separated from the aircraft and was lying on the floor of the aircraft recovery facility in a bag. The alternator and propeller were separated, the left aft side of the oil sump was torn and displaced to the right. The top side of the accessory end of the engine was fractured and all of the accessories were separated with the exception of the starter adapter and oil pump. The intake filter, throttle body, and left side intake tubes were separated from the induction system. The #2 and #4 exhaust risers were separated from the engine. The #2 and #4 cylinder heads were fractured and separated from the barrels, both of which sustained tearing and bending deformation damage. The remaining cylinders sustained impact related damage of varying degrees. The magneto mounting pads were separated from the engine and the magnetos were separated. A hole was observed in the crankcase over the #1 cylinder; however, the edges of the hole were deformed inward. Though the engine sustained significant impact-related damage, there was no sign of operational discoloration or pre-accident operational distress.

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### ENGINE EXAMINATION SUMMARY

The impact-related damage precluded the functional testing of the engine and the engine-related systems; however, there were no pre-accident anomalies noted on the observed components. The deformation damage sustained by the crankcase and the #2 and #4 cylinders precluded the manual rotation of the crankshaft. The camshaft was visible through its entirety through the crankcase halves after the oil sump was removed and no pre-accident anomalies were noted with the camshaft lobes, cam gear, and bevel gear. The crankshaft, connecting rods, and counterweights were observed using a lighted borescope with no signs of discoloration or lubrication distress. Disassembly of the oil pump revealed that the gears were intact. Slivers of shaved metal were observed on the pump cap and on the gears, and areas of rotational scraping were noted on the housing walls, indicative of pump rotation at the time of impact. All of the components were intact with no internal pre-accident anomalies noted.

The cylinder barrels remained attached to the crankcase. All of the cylinder heads sustained impact-related fracture damage with the left side sustaining the most damage. The #2 and #4 cylinder heads were fractured and separated from their respective barrels, and the barrels were torn and bent over the piston. The top sparkplugs were removed from the #1, #3, #5, and #6 cylinders and a borescope was used to examine/document the internal components. No pre-accident anomalies were noted with any of the pistons, barrels, cylinder heads, valves or valve seats.

The intake shroud and filter were flattened, but remained intact with no obstructions noted with the intake filter. The throttle body and the throttle shaft were fractured.

The fuel injection system was separated from the engine. The engine-driven fuel pump was separated from the backside of the engine, but its deformed drive coupling remained inserted into the crankshaft gear and pump adapter. Only the engine-driven fuel pump cap (aneroid bellows and low pressure relief valve set screw) were observed. The throttle body was fractured and the fuel metering unit was separated. The throttle and mixture control levers were deformed and a portion of the mixture shaft was pulled from the housing and bent. The fuel fittings were fractured. Removal of the inlet screen revealed it was clear with no obstructions observed. The fuel manifold valve was not

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observed.

The magnetos were separated from their mounts and the mounting area was separated from the engine. Remnants of fractured magnetos were located in the debris. The top half of the left magneto was observed. The distributor gear remained intact and the teeth were undamaged. The drive shaft/magnet and windings were not observed. Remnants of ignition leads remained attached to the distributor cap. Only the capacitor and points portion of the right magneto was observed. The #1, #3, #5, and #6 top sparkplugs were removed from their respective cylinders. The #5 and #6 top sparkplug barrels were fractured. Examination of the observed electrodes revealed no evidence of carbon or lead fouling with normal wear conditions.

The propeller was separated from the crankshaft and the stripped propeller bolts remained with the crankshaft flange. All three blades remained attached to the hub, but all could rotate freely within the hub indicative of pitch change link fractures. Blade #1 was bent forward almost 180° with some chord-wise paint burnishing near the tip. Blade #2 was twisted 180° toward low pitch at the tip. Blade #3 was bent forward 180° at the tip.

| ENGINE COMPONENT EXAMINATION |
|------------------------------|
|------------------------------|

|                       |                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------|
| <b>EXHAUST SYSTEM</b> | <i>NOTE:</i> It was not clear to which engine the separated exhaust components belonged. |
|-----------------------|------------------------------------------------------------------------------------------|



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## INDUCTION SYSTEM



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## IGNITION SYSTEM

### LEFT MAGNETO



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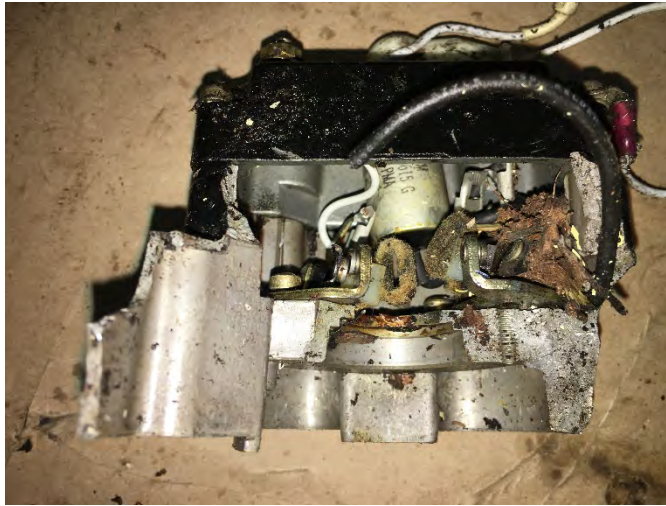
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## RIGHT MAGNETO



## SPARK PLUGS



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1T



1B



3T



3B



5T



5B

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6T



6B

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### FUEL SYSTEM

#### FUEL PUMP



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## THROTTLE BODY METERING UNIT



## FUEL MANIFOLD VALVE

Not Observed

## FUEL NOZZLES AND LINES

All Fractured

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### LUBRICATION SYSTEM

#### OIL SUMP



#### OIL PICK-UP TUBE & SCREEN



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## OIL PUMP



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### OIL FILTER



### OIL COOLER

NOTE: It was not clear to which engine the separated oil coolers belonged.



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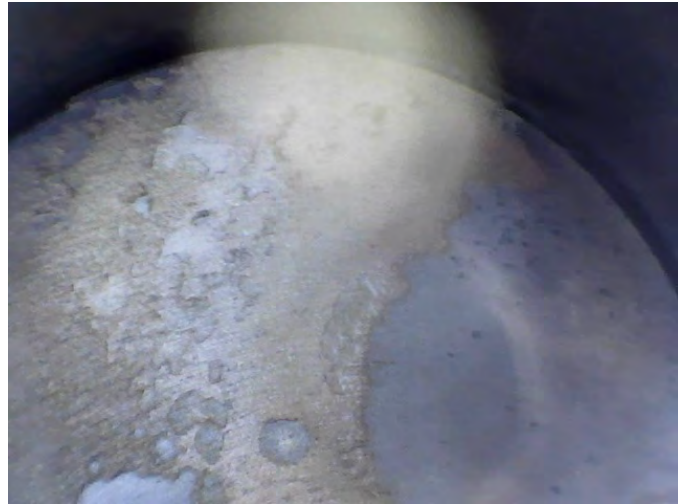
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### CYLINDERS

#### CYLINDER #1



#### CYLINDER #3



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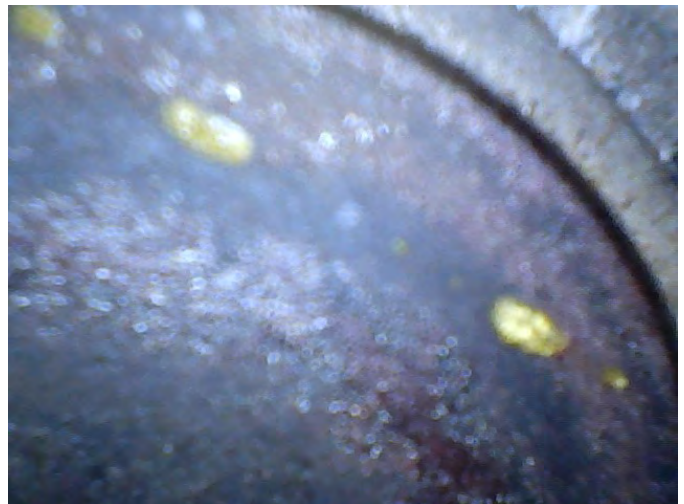
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CYLINDER #5



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## CYLINDER #2



Cylinder Head Not Observed

## CYLINDER #4



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FILE NUMBER:

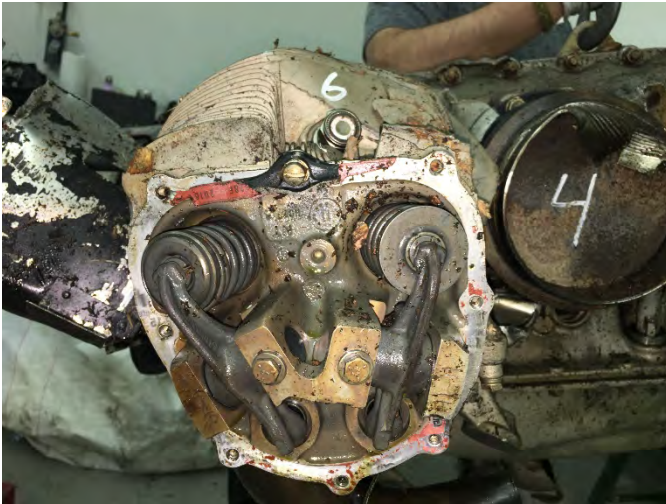
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## CYLINDER #6



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### CRANKCASE ASSEMBLY

#### CRANKCASE



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### CRANKSHAFT ASSEMBLY

#### CRANKSHAFT



#### TRANSFER COLLAR



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## COUNTER WEIGHTS



## CONNECTING RODS



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### CAMSHAFT

#### CAMSHAFT



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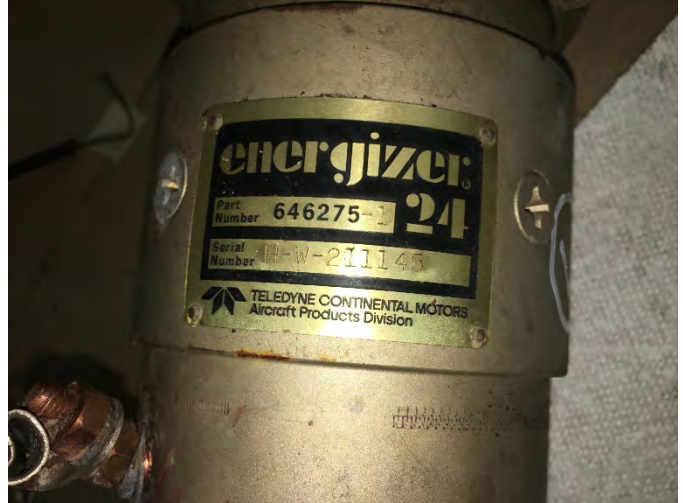
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### ACCESSORIES

#### STARTER



#### STARTER ADAPTER



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ALT/GEN #1



VACUUM  
PUMP

NOTE: It was not clear to which engine the separated vacuum pump belonged.



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### PROPELLER

#### PROPELLER GOVERNOR

*NOTE:* It was not clear to which engine the separated propeller governors belonged.



#### PROPELLER



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