



## MEMORANDUM FOR RECORD

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**Air Safety Investigator**  
**Eastern Region Aviation**

**February 8, 2021**

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**Subject:** NTSB investigation ERA19FA249, N303TL, Cessna T303, Lagrangeville, New York, August 17, 2019. Airframe and Engine Examination

**On Scene:**

**Airframe:**

Examination of the wreckage revealed that most of the fuselage forward of the aft bulkhead was destroyed by fire. Except for the empennage, most of the wreckage that remained was found within the extents of the right (north) half of the house foundation perimeter. The north half of the house structure and roof was consumed by fire. The empennage remained largely intact and was found with the right horizontal stabilizer leaning against what remained of the rear wall of the house, oriented on a heading of about 030° magnetic. The damaged left wingtip, left engine, right engine, and the right (green) navigation light lens were found oriented along a line from the rear of the house to a bush by the front wall of the house, roughly the length of the wingspan and oriented perpendicular to the empennage. The cabin heater, which is mounted in the nose of the airplane was found about 15 feet away from and in line with the orientation of the empennage.

Flight control continuity was confirmed from what remained of the flight control tubes near the cockpit, to the rudder, the elevator and to the outboard aileron bell cranks in each wing. Neither of the aileron pushrods were found. All cable ends were found at their respective attachment points. The right aileron cable was fractured in one location near the bell crank. The rudder and elevator trim actuators were near their neutral position. The aileron trim condition could not be determined. The remnants of the landing gear were found in the retracted position. The flap jackscrew actuator was consistent with the retracted position. All of the cockpit instruments were consumed by fire and none were located except for one 2-inch diameter dial face that was illegible but consistent with a vacuum gauge. A metal avionics rack was located with ash inside. Several loose metal unidentified toggle switches were found near the cockpit area. Neither of the two electric fuel boost pumps were located. Remnants of both fuel selector valves were found; however both were too thermally damaged to determine their position.

The cockpit engine and propeller controls were located, however the preimpact position of the levers and the cable continuity to each engine could not be determined due to thermal damage.

**Engines:**

Several spark plugs, rocker arm assemblies and pushrods were found loose in the wreckage and could not be associated with a specific engine or cylinder.

The left engine was found in an upright position with damage consistent with thermal and impact forces. The crankshaft could not be rotated by hand. All six cylinders remained attached but exhibited impact and thermal damage. Cylinder Nos. 1, 3, and 5 exhibited impact and thermal damage with cooling fins being crushed. Cylinder Nos. 2, 4, and 6 were impact and thermally damaged with the top half of each cylinder melted away. The intake and exhaust rocker arms and shafts were separated from cylinder Nos. 2 and 4. The No. 6 cylinder head separated exposing a thermally destroyed piston dome. Only the piston skirt remained in the cylinder with the piston pin in place.

The left and right magnetos remained attached, but both exhibited thermal damage to the case assemblies. The top sparkplugs removed from cylinder Nos. 2 and 4 were normal in wear when compared to a Champion Sparkplug "Check-A-Plug" chart and slightly dark in color.

The induction components exhibited impact and thermal damage. The throttle body and mixture unit separated and were not located. The fuel manifold was thermally destroyed. The engine-driven fuel pump was thermally damaged, and the drive coupling was stuck in the drive gear resulting in the damaged fuel pump not being removed.

Exhaust components were impact damaged but the turbocharger and associated components remained attached. The compressor side of the turbocharger was thermally destroyed. The turbine section of the turbocharger remained intact. The V-band clamps were intact and in place. The turbine wheel was intact and did not exhibit any abnormal wear or impact damage.

The three-blade constant speed propeller assembly remained attached to the crankshaft propeller flange. A single propeller blade was visible in the debris with the other two blades thermally destroyed. All three propeller shanks remained attached to the thermally damaged propeller hub.

The right engine was found inverted with damage consistent thermal and impact forces. The crankshaft could not be rotated by hand. All cylinder bases remained attached at their respective mounting pad. The cylinder Nos. 1 and 3 rocker covers were partially separated with thermal and impact damage. Rocker arms and shafts were intact on cylinder Nos. 1 and 3. The cylinder No. 5 cylinder head (forward portion) was missing exposing an intact piston. The Nos. 2, 4, and 6 cylinder heads were separated or melted away exposing intact pistons.

The 3-blade constant speed propeller was separated from the crankshaft propeller flange. Three propeller blade inboard shanks were located near the inverted right engine however the blade portions were thermally destroyed. A partial propeller hub was also located nearby with the dome cover and spring intact.

The left magneto was separated from the engine and not recovered. The right magneto remained attached but was impact and thermally damaged. The outer case assembly separated exposing the internal shaft and bearings. The sparkplugs remaining in cylinder Nos. 1, 3, and 5 were removed and examined. When compared to a Champion Sparkplug "Check-A-Plug" chart, bottom sparkplugs 1, and 3 were normal in wear but slightly dark in color. Bottom sparkplug 5 contained debris due to the compromised cylinder head. The top No. 1 sparkplug contained debris consistent with fire retardant foam. The top No. 3 sparkplug was normal in wear but slightly dark in color when compared with a Champion "Check-A-Plug" chart.

The induction components exhibited impact and thermal damage. The throttle body and mixture unit separated and were not located. The engine-driven fuel pump was thermally destroyed. The

oil sump was breached and no oil was present. An oil filter was discovered near the engine. This oil filter was cut open and found thermally damaged with no metal particles present.

The exhaust components were impact damaged. The turbocharger and associated components remained attached. The compressor side of the turbocharger was thermally destroyed. The turbine section of the turbocharger remained intact. The V-band clamps were intact and in place. The turbine wheel was intact and did not exhibit any abnormal wear or impact damage.

### **Continental Aerospace Technologies – Mobile, Alabama – February 8, 2021**

A follow-up examination of both engines was performed at Continental Aerospace Technologies on February 8, 2021, with remote video/audio oversight by the NTSB. The pistons and cylinders were examined for evidence of detonation or pre-ignition. Of all the pistons that remained relatively intact, there were no holes found in the piston tops. The right engine Nos. 1 and 3 pistons had little or no thermal damage or melting and otherwise appeared normal with no indications of detonation or pre-ignition. All of the other pistons (on both engines) had varying degrees of thermal and melting damage which precluded the identification of any signatures uniquely consistent with detonation or pre-ignition.

The right engine Nos. 1 and 3 cylinder heads remained attached, as did the left engine Nos. 2 and 4 cylinder heads. All other cylinder heads had separated partially or completely from the engine.

**Left Engine:**

The Nos. 2 and 4 cylinder heads remained attached. All others were partially or completely separated.

The No. 5 piston was almost entirely melted

The No. 3 piston top was partially melted at its lower edge

The No. 1 piston top was partially melted



*Figure 1 Left Engine Cylinders 1, 3, 5*

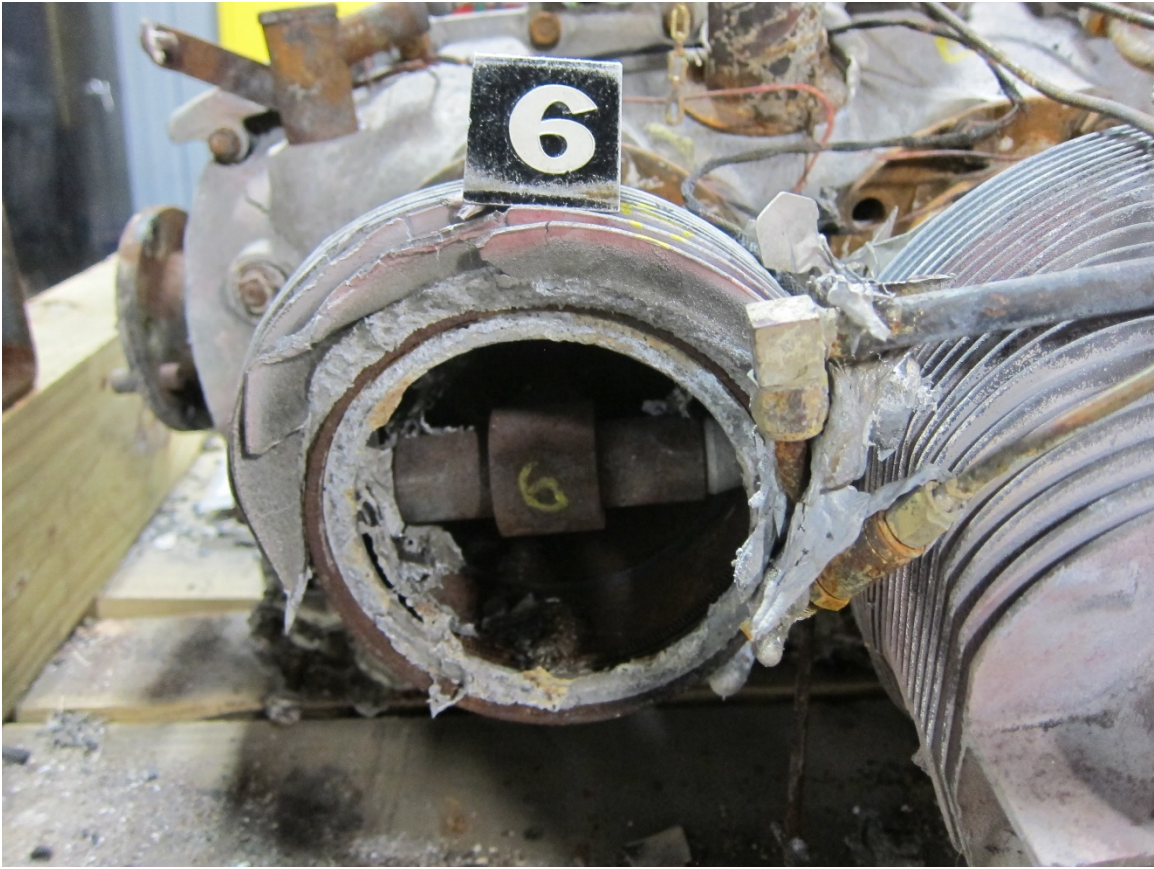
The Nos. 2 and 4 piston tops (examined via borescope) had some melting material on their lower edge, there was no melted piston material found on the spark plugs.  
The No. 6 piston was almost entirely melted



Figure 2 Left Engine No. 2 Spark Plug



Figure 3 Left Engine No. 4 Spark Plug



*Figure 4 Left Engine Cylinder 6*

**Right Engine:**

The number Nos. 1 and 3 cylinder heads remained attached to the engine, all others were separated.

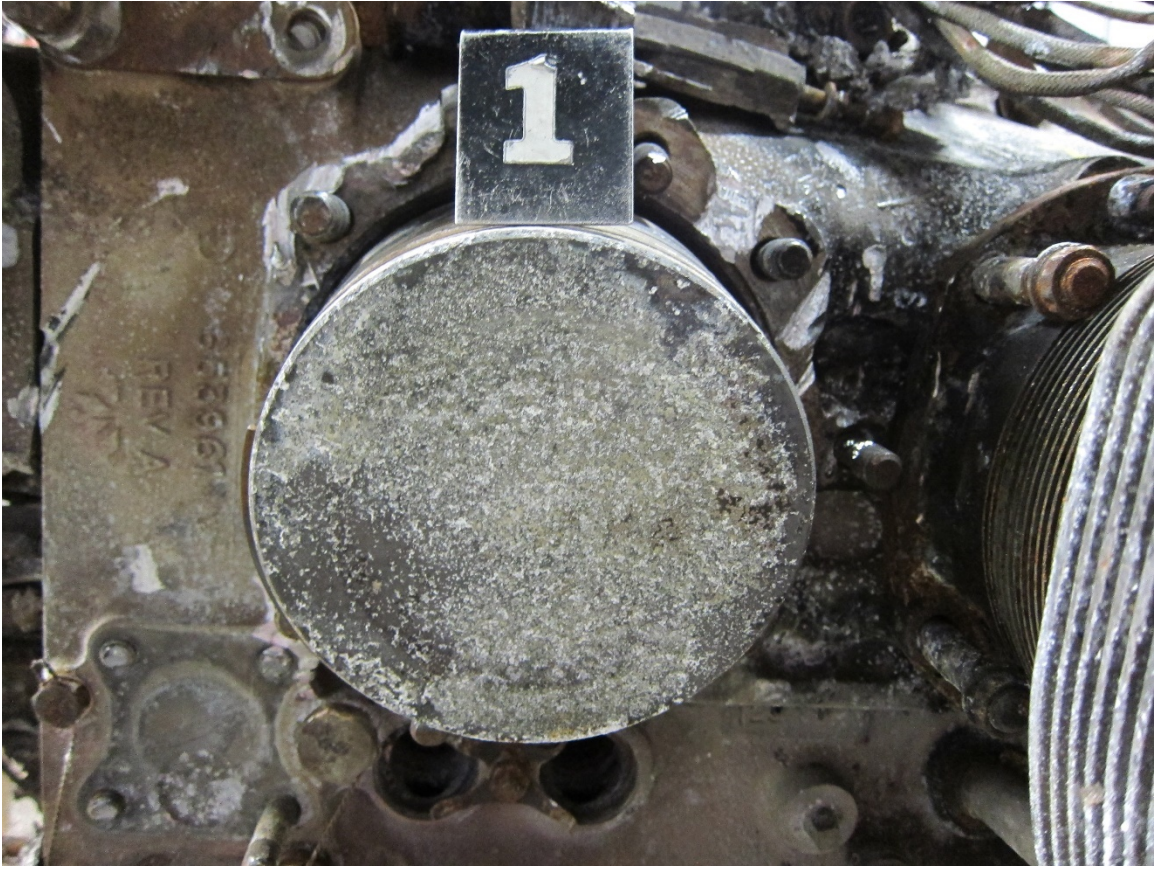
The No. 5 piston top had some melting on the piston top

The No. 3 (examined via borescope) piston top did not appear to have any melting or damage

The No. 1 piston top did not appear to have any melting or damage, there was no melted piston material on the spark plug.



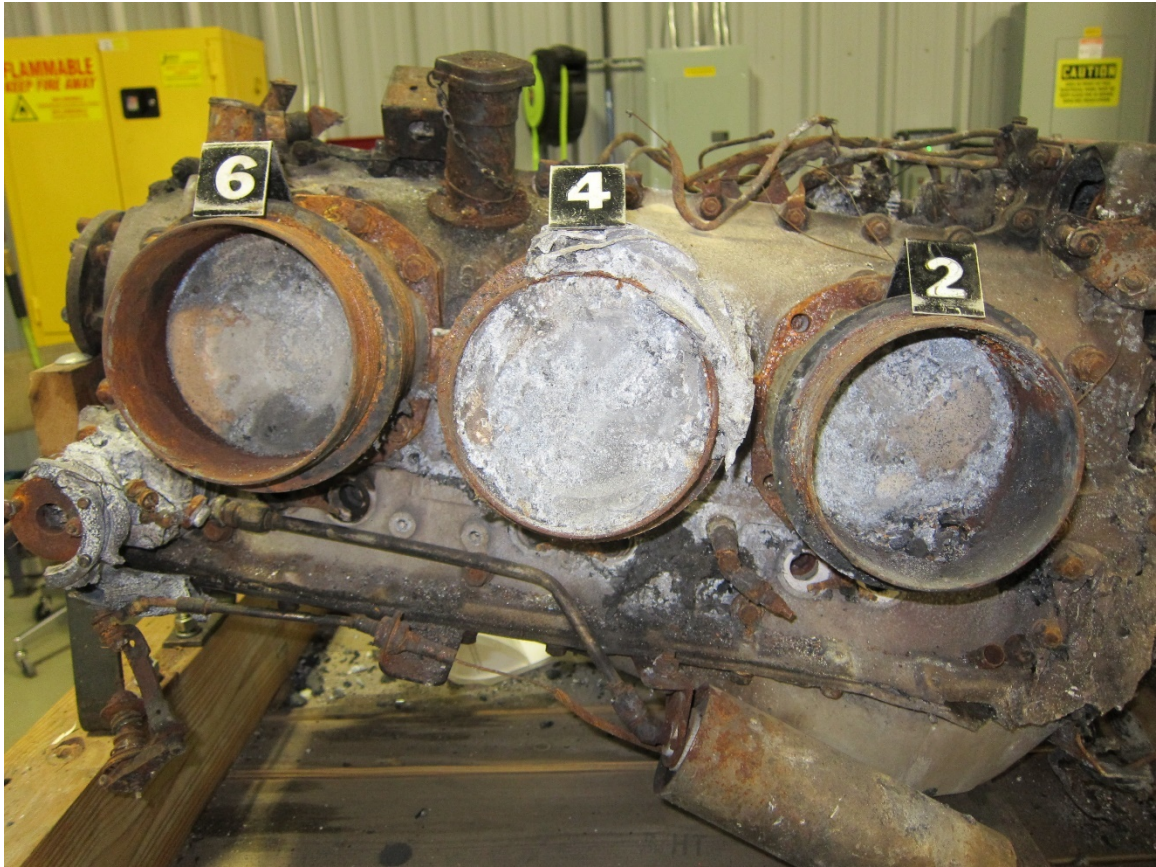
*Figure 5 Right Engine No. 5 Piston Top*



*Figure 6 Right Engine No. 1 Piston Top*



The Nos. 6, 4 and 2 piston tops had some melting/ thermal damage



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