



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region
April 26, 2016

AIRFRAME AND ENGINE EXAM REPORT

WPR16FA091

This document contains 10 embedded photos.

A. ACCIDENT

Location: Fallbrook, CA

Date: April 2, 2016

Aircraft: Nokes Matthew Lancair IV P, Registration Number: N438Y, Serial #: LIV-298

NTSB investigator-in-charge (IIC): Howard Plagens

B. EXAMINATION PARTICIPANTS:

Howard Plagens
Senior Air Safety Investigator
National Transportation Safety Board
Federal Way, WA

Chris Lang
Air Safety Investigator
Continental Motors Inc.
Mobile, AL

C. Summary

Examination of the recovered airframe and engine was conducted on April 26, 2016, at the facilities of Air Transport, Phoenix, Arizona. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

No airworthiness certificate or registration was located inside the airplane.

The IIC established control continuity during the on scene investigation.

The air filter was clean.



Photo 1 Air Filter

2.0 Engine Examination

The engine was a Continental Motors Inc. TSIO-550-E, serial number 803031, rated at 350 horsepower.

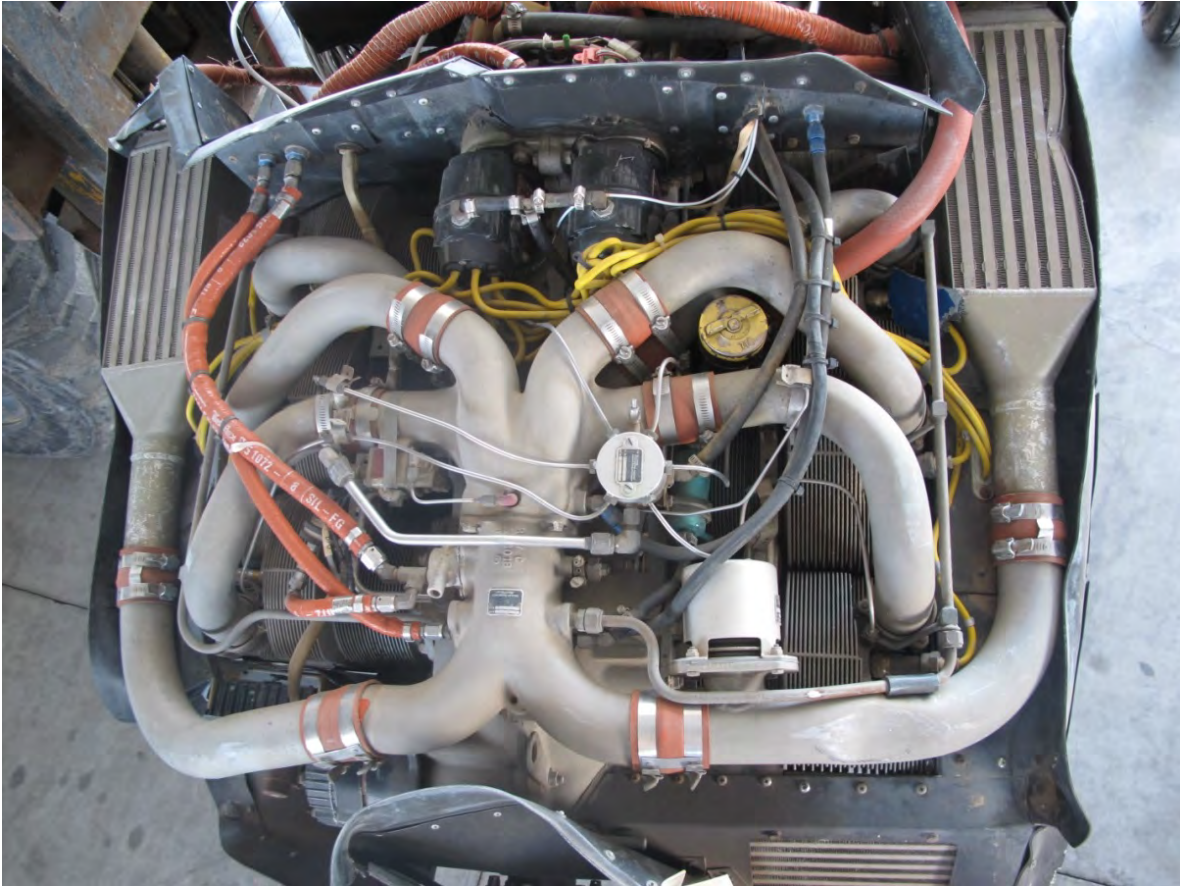


Photo 2 Top of Engine



Photo 3 Left Side of Engine



Photo 4 Right Side of Engine

Investigators left the engine in place on the airframe. They manually rotated the crankshaft with the propeller. The crankshaft rotated freely; the valves moved approximately the same amount of lift in firing order, and the gears in the accessory case turned freely. Investigators obtained thumb compression on all cylinders in firing order.

Investigators removed the top spark plugs from the right side (cylinders one, three, and five) and the bottom spark plugs from the left side (cylinders two, four, and six). All electrodes were fine wire, and clean with no mechanical deformation. The spark plug electrodes were gray, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart.



Photo 5 Spark Plugs (Top One, Three, Five, and Bottom Two, Four, Six)

A borescope inspection revealed no mechanical deformation on the valves, cylinder walls, piston faces, or internal cylinder heads.

Investigators manually rotated the propeller, and both magnetos produced spark at the ignition leads for the bottom spark plugs on the left side (cylinders two, four, and six), and the top spark plugs on the right side (cylinders one, three, and five).

The oil sump was crushed up.



Photo 6 Oil Sump

The inlet for each turbocharger compressor was clear, and the rotors for each one turned freely.



Photo 7 Right Turbocharger Compressor Vanes



Photo 8 Left Turbocharger Compressor Blades

Investigators disconnected the fuel line from the gascolator to the engine driven fuel pump, and nothing drained from the line. They then disconnected the fuel inlet line to the fuel manifold valve on top of the engine, and nothing drained from the line.

Recovery personnel installed a two-bladed propeller on the engine. They plumbed an external fuel source to the left wing tank fuel line, and fuel was observed leaking from the belly of the airplane. They disconnected from the left side, and plumbed into the right wing fuel line.

Both sides of the exhaust exhibited ductile bending. The left exhaust pipe was displaced and disconnected at the slip joint for cylinder number two and the junction from cylinder number four to number two. A metal plate was partially wrapped around the exhaust junction to prevent hot exhaust gases being directed to the engine core. The slip joint for the cylinder was cut to partially align the exhaust flow.

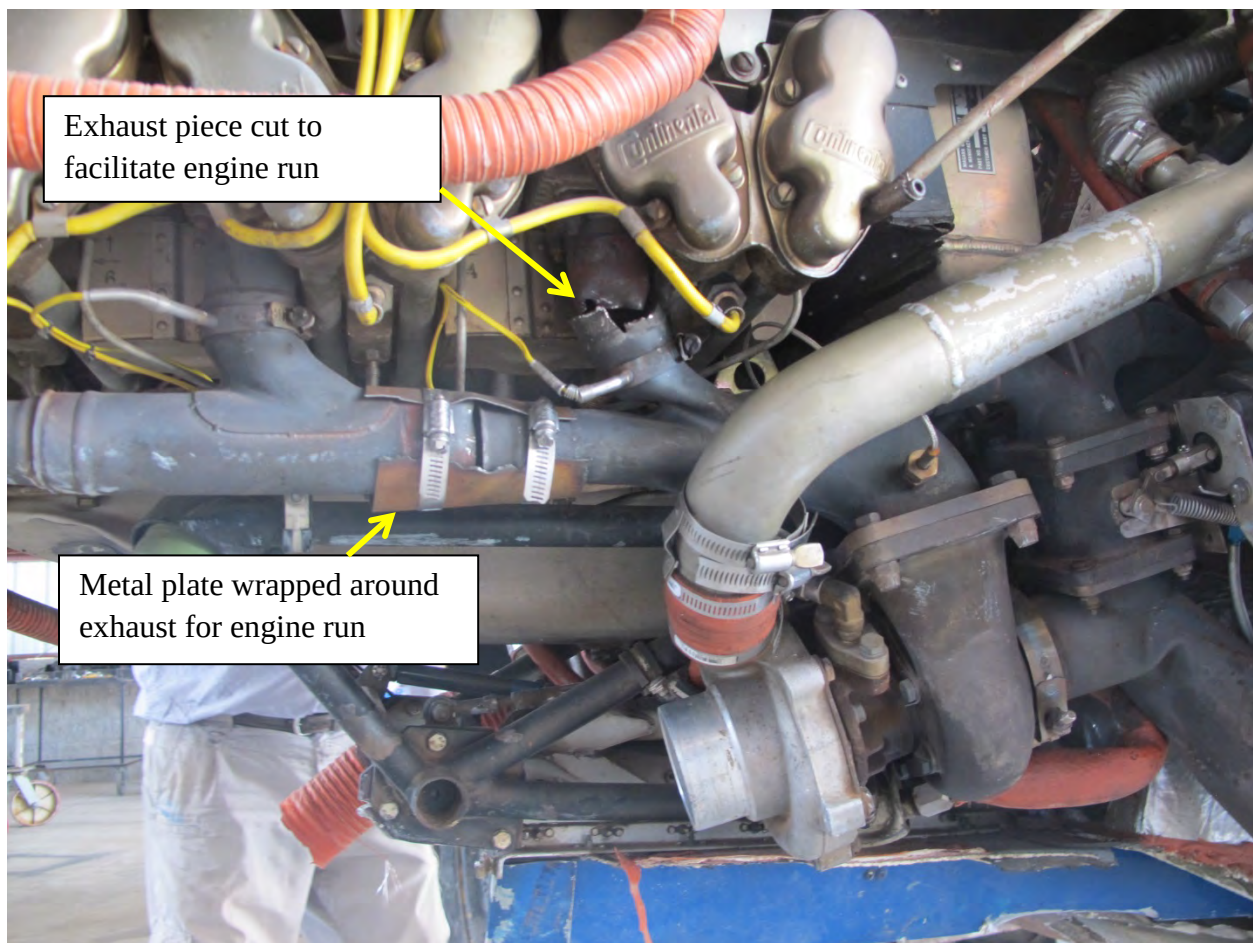


Photo 9 Engine Modifications for Engine Run

The airframe electric fuel boost pump was operated via a three-position rocker switch on the instrument panel; top was high, middle was off, and bottom was low. The high position was used to prime the engine, and fuel was leaking from the right side of the engine compartment. It was determined that the drain from the gascolator was in the open position. After closing the drain, the engine was started, and ran for about 1 minute before it quit. It was determined that the fuel selector valve in the cockpit was still in the off position after it was secured when the fuel leak from the gascolator was observed.

The engine was started again. After a minute at a low rpm, the throttle was advanced, and the engine speed increased to mirror that movement. The instruments in the cockpit were not functional, so rpm and fuel flow could not be determined. At an interim setting, a magneto checked was performed, and a noticeable sound change occurred to the engine rpm. The engine ran smoothly with the throttle pulled to the idle position. The throttle was advanced to the full in, full power position, and the engine rpm followed. The power was only held there for a few seconds. When the power was pulled back quickly from full power, the engine initially sputtered and backfired, then ran smoothly until the engine was shut down normally using the mixture control. The engine was run a total of several minutes with no anomalies noted.

3.0 Propeller Examination

The propeller was a Hartzell Semitar

All three propeller blades remained attached at the hub, but were loose, and rotated in the hub. All three propeller blades were bent aft, and all three tips curled aft.



Photo 10 Propeller