

TSIO-550 Engine Over-speed Incidents



by bob pastusek

Two recent engine over-speed incidents involving Continental TSIO-550 engines have resulted in one destroyed Lancair IV-P and two destroyed engines. While the failure mechanism of the engines was different, both occurred immediately after a temporary reduction in oil pressure and over-speed of the engine as recorded by the engine monitoring systems.

On 15 November 2015, a Lancair IV-P experienced a total loss of power during recovery from a practice emergency descent. The emergency descent profile included a low-G pushover that resulted in a momentary reduction of oil pressure from 50 to 36 PSI, and subsequent engine over-speed to 3400 RPM for the TSIO-550. The aircraft was destroyed during a controlled off-airport landing; the crew walked away with minor injuries. Post-crash examination of the engine revealed that both magnetos had sheared teeth from the ignition distributor gear, preventing ignition pulses from being distributed to the proper spark plugs. Several components were damaged when the engine was ejected from the airframe during landing. Upon replacement of these components, the core engine was able to produce full power on the Continental Motors test stand during the subsequent NTSB investigation ([final report here](#)).

On 1 June 2017, another Lancair IV-P experienced a total loss of power immediately following a zero-G maneuver. The pilot was performing a required maneuver to calibrate an installed Advanced Flight Systems angle of attack indicator when the engine failed. The aircraft was safely recovered to an airport within gliding distance. Post-landing inspection showed broken connecting rods that breached the crankcase and both magnetos broken from their respective mountings. Recorded engine data indicated a reduction of oil pressure to 4 psi and subsequent engine over-speed to 3140 RPM during the push-over to zero-G.

At first blush, these engine failures might seem unrelated—certainly the failed engine components were different. Here are the common elements to both incidents for your consideration: Both Lancair IV-Ps were in otherwise good condition, with engine and propeller components at mid-life. Both aircraft were powered by a TSIO-550, turning a 4-blade MT wood/composite propeller controlled by a McCauley prop governor. Both engine failures occurred just after low-G maneuvering that was accompanied by momentary decrease in oil pressure and momentary engine over-speed. The recorded over-speed for both engines was less than 20% above the engine 2700 RPM rated limit, and recorded oil pressure never reached zero, although the data recording interval may have precluded capture of the peak RPM/minimum oil pressure values in both cases.

LOBO believes these failures warrant an alert to our Lancair owner/operators. We don't have—and may never have—conclusive data to support a formal finding for the cause of these failures; nor do we have proposed corrective action. Nonetheless we would like to make you aware of the potential for an engine failure during low-G maneuvering that un-ports the engine oil pick-up. This is a common maneuver during flight training and testing; so there are some precautions you might consider if you intend to perform low/zero-G maneuvers. First, reduce engine power to idle before initiating the maneuver, and consider adjusting the propeller to high pitch to lessen the likelihood of an engine over-speed. Likewise, entering the maneuver below cruise airspeed may help keep the engine RPM down. The idea is to lessen the ability of the engine to accelerate quickly should a momentary reduction in oil pressure to the prop governor allow the prop to move to flat pitch and drive the engine to an over-speed condition.

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