

Balance rod failure in a 2006 Toyota Prado



Background

- I purchased this vehicle in August 2011 and had just 4,000 kms on it. I use high grade 20W-50 oil and change the filter and oil every 5,000 kms (3,000 miles).
- The engine failure occurred during a five-hour trip from Quito to Canoa. The trip involves a one-hour climb in altitude from 2,800 meters to 4,000, followed by a four hour-drop to sea level. The failure occurred after four hours of mild driving (between 2,000 and 3,500 RPMs). No over-heating was experienced.
- The engine did not noticeably lose power. I became aware of the problem when I heard a sound of “marbles” dancing in the oil distribution system.

The engine: Toyota 3RZ-FE



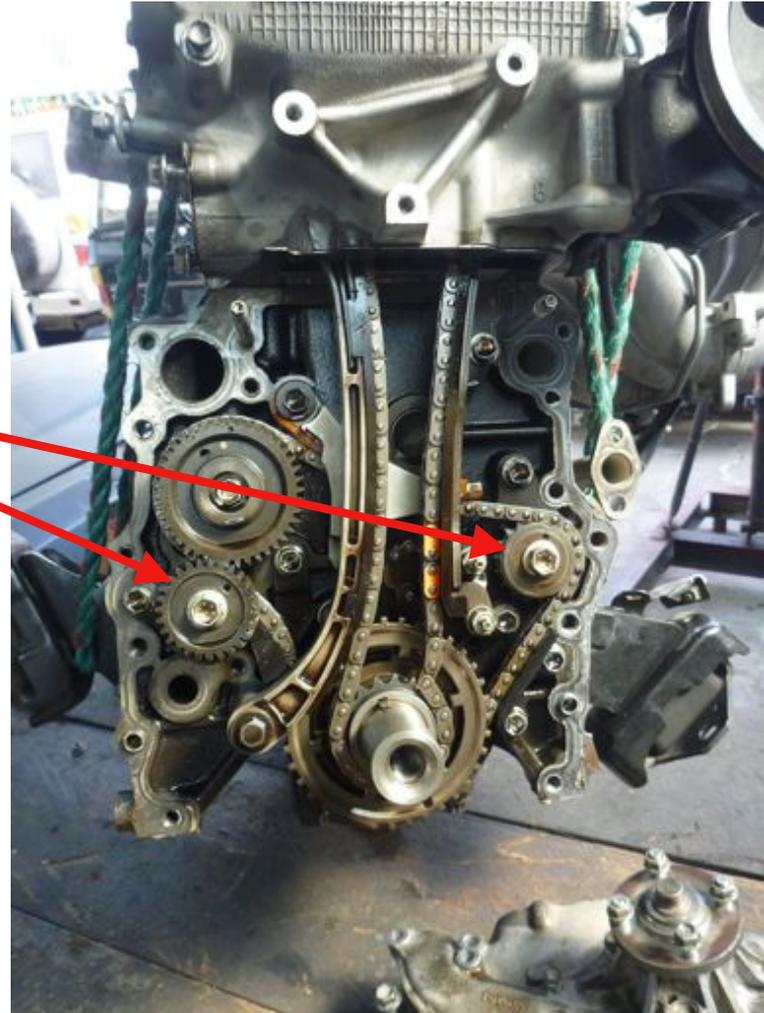
Depending on country, this motor is found in: Toyota Prado (00-06), Hilux and Tacoma (95-04), 4Runner (96-00), and T100 (95-98)

About the 3RZ-FE

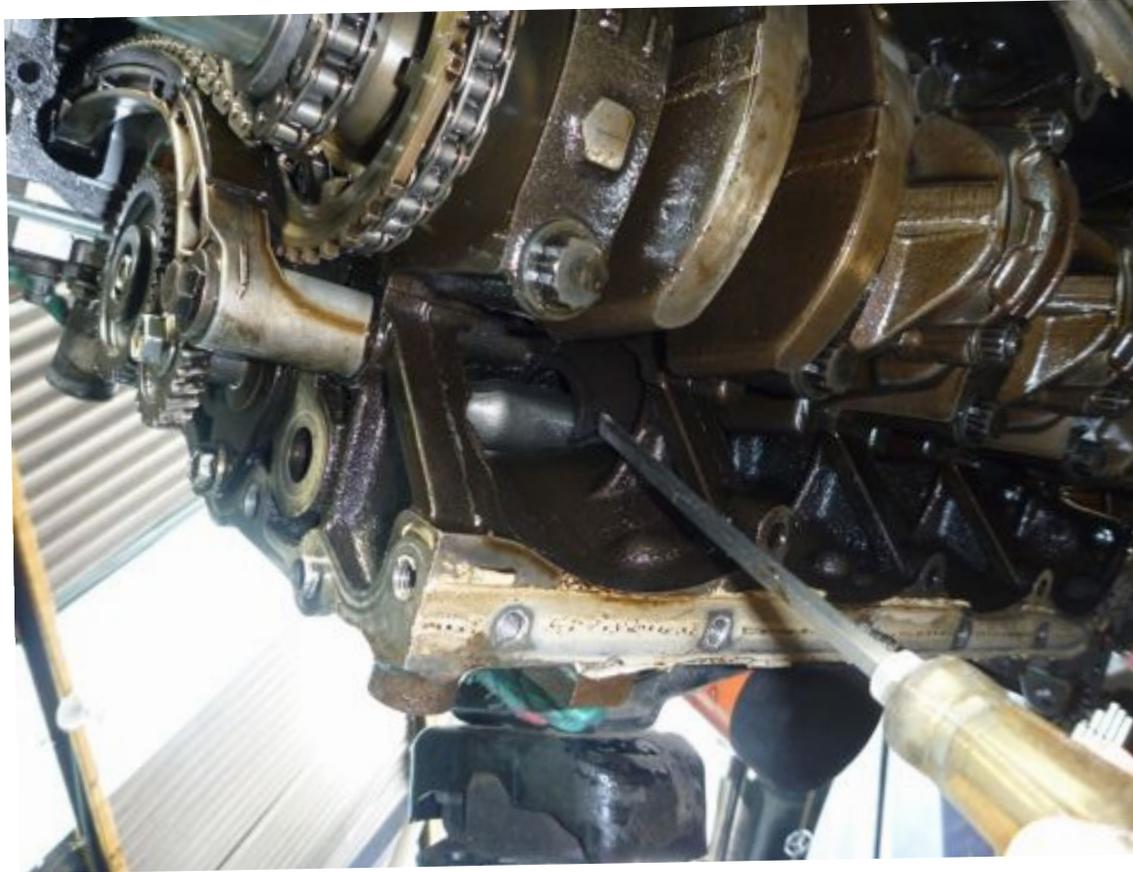
- The Toyota RZ engine family is a straight-4 piston engine series. The RZ series uses a cast iron engine block and aluminum SOHC or DOHC cylinder heads. It has MFI fuel injection, 2 or 4 valves per cylinder and features forged steel connecting rods.
- The 3RZ-FE is a 2.7 L (2,693 cc) I4 version built in Japan. Bore is 95 mm and stroke is 95 mm. Compression ratio is 9.5 to 1. Output is 150 hp (112 kW) at 4800 RPM with 177 ft·lbf (240 N·m) of torque at 4000 RPM. It has four valves per cylinder and DOHC. Valve adjustment is by shim over bucket. **This engine features twin, chain-driven balance shafts.**

Timing chain

Twin balance shafts
(failed shaft on the left)



Failed balance shaft seal



This led to damage to the block and sent metal shards into the engine, damaging the oil pump and potentially other areas.

Heating and warping damage to balance shaft (and block)



According to a mechanic at Toyota in Quito, the problem was tied to not using the recommended grade oil/filter and change intervals, and/or abusive engine use. A mechanic from a local machine shop told me that they had repaired over a dozen Toyota engines with the same problem in the last two years. In each case, the engine had between 50,000 and 75,000 miles when a balance rod seal failed. The machine shop recommended eliminating the balance shafts and welding shut the holes.

My questions:

1. Was the failed balance shaft seal a cause of the problem or a symptom of something else?
2. Have others experienced this problem?
3. What are your thoughts on the machine shop's suggestion of eliminating the balance shafts?