

# FROM THE SHOP FLOOR

*In previous TDR magazines we've had input from repair shop locations and we've scattered the articles throughout the magazine. In this issue my thanks goes to Scott Kilby at TST Products for his contribution. I'm hopeful we will have continued contributions from repair shop locations and accessory shops, as their experience is invaluable.*

*The call goes out to service locations—send us your tips. It is the best advertising you can do for your shop.*

## 12-VALVE DOWEL PIN COMMON-SENSICAL SOLUTION

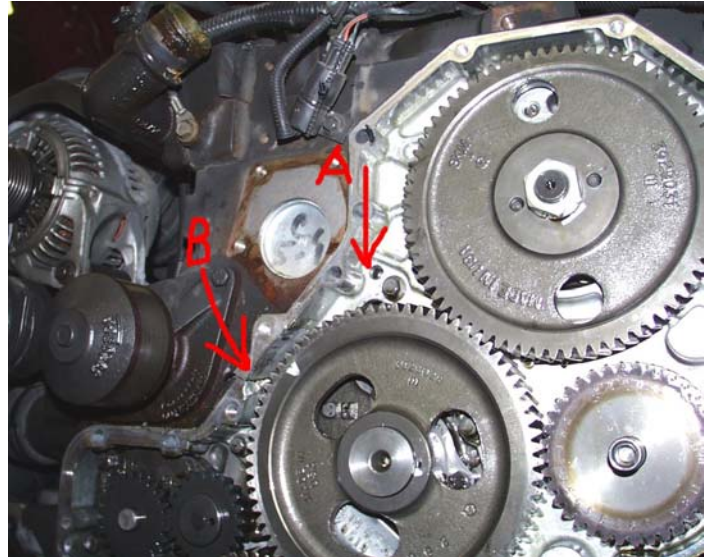
Always on the lookout for a better way to accomplish a task, the folks at TST products have developed a common-sensical (is that a word?) method to correct the dowel pin problem that many owners have seen with their 12-valve engines. Before I present their solution, let's provide a brief history of the problem.

The dowel pin has been (starting with production in 1983), and continues to be, used on the Cummins B-series engine as a locating and alignment point for the attachment of the front gear cover to the engine block. The problem that has been encountered by owners is predominately with the '94 to '98 12-valve engines. The dowel pin is not a problem on 24-valve engines as the timing cover was changed to fit the 24-valve's VP44 fuel pump. These 12-valve engines have the heavier Bosch P7100 fuel pump which was required for higher horsepower ratings and for the higher injection pressures needed to meet stricter emission legislation enacted 1/1/1994 (see our "Technical Topics" article on page \_\_\_ for further details).

The belief is that the vibrations and weight of the P7100 fuel pump cause the dowel pin to loosen in its bore and possibly fall out. If the dowel pin does fall, it can be caught in the fuel pump gear causing a major problem (cracked cam nose); or it can fall between the cam gear and the front housing and, in its path to the bottom of the oil pan, crack the gear case housing. I've heard many a story of how the cracked housing has been fixed using J-B Weld epoxy. Alternately, the gear housing can be removed and replaced, but this is a big task as the engine's camshaft has to be removed to remove/replace the housing. A final fall-out scenario, the pin falls to the bottom of the oil pan and resides in the bottom of the pan forever (or at least until the pan is removed). There is a screen on the oil pickup tube that prevents the pin from moving into anywhere other than the bottom of the oil pan.

## The TST Solution

Several methods of securing the pin into its bore have been developed by shops that service B-series engines. These methods have been covered in previous TDR magazines (Issue 38, page 136; Issue 33, page 46). Additionally, there is a thread on the TDR web site that takes you through the "how-to" should one wish to use the drill/jig method. However, on a recent visit to TST's shop outside Columbus, Indiana, I discovered yet another way to perform this preventive maintenance type procedure.



For those not familiar with the dowel pin the arrow shows its location.



A close-up picture of the dowel pin.

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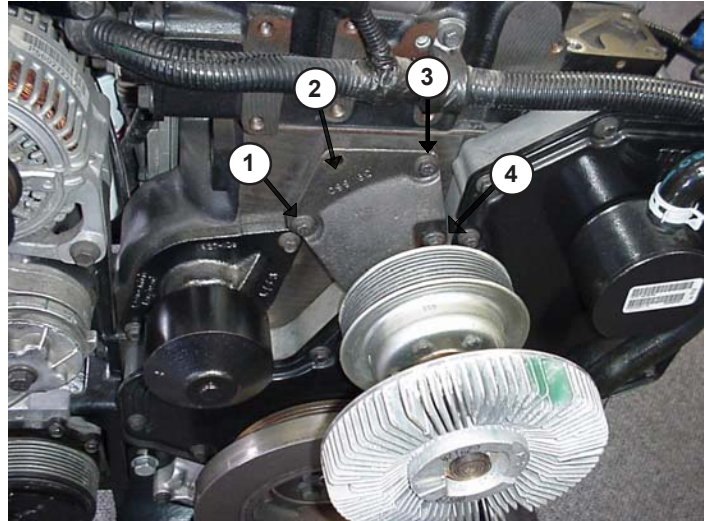
Above is a picture of an egg-shaped washer that is their solution to the problem.

Again, many methods of dowel pin preventive maintenance have been previously discussed. Using some TST shop short-cuts, and the TST developed egg-washer, the task of dowel pin correction has been reduced from highly involved to a job that can be tackled by the shadetree mechanic. A brief descriptive of the steps involved (again, shadetree-type work as it is simply parts removal and installation) and a few key pictures will take you through the major steps. TST has a comprehensive set of instructions, an egg-washer, with a longer gear cover bolt, a Cummins crankcase seal, a tube of gasket maker (RTV) for the front cover. The price for the kit is \$48. As a note, TST suggests that you consider a replacement fan belt (it's time to change the belt and keep the old one for a spare) and replacement hoses (time to change these too). You'll find other vendors offer these replacement parts.

The TST shop guys have this project down to a two hour science. Lots of removals are necessary, but the repair is simple in scope.

- 1) Drain and remove the coolant overflow tank.
- 2) Drain and remove, or push to the side, the windshield washer tank.
- 3) Remove 10mm bolts (4) and clips that hold the fan shroud in place. The fan shroud will later be removed with the fan in step 7.
- 4) Remove engine accessory drive belt using your 3/8" ratchet in the belt tensioner access socket.
- 5) Cut a piece of cardboard big enough to cover the engine-side of the radiator. Tape the cardboard into place.

- 6) Locate the 10mm bolts (4) for the fan support bracket. Remove the three (#1, #2, #3) easy-to-access bolts. The last bolt (#4) can only be removed with an open end wrench. Support the fan assembly with one hand and loosen the bolt with the other, making sure not to damage the radiator fins.



- 7) CAREFULLY work the fan and the fan shroud out together. This takes time, so go slow. Working with a friend helps. Make sure not to DAMAGE the radiator cooling fins or any hoses that may be in the way.
- 8) Remove the engine oil fill tube located at the front upper side of the gear case. To do this, remove the one 16mm bolt from the bracket to the cylinder head, and loosen the 8mm bolt that clamps the bracket to the oil fill tube. Now rotate the bracket out of the way, and with the use of a large pair of pliers rotate the assembly counter-clockwise to remove it from the gear case cover.
- 9) Remove the two 13mm nuts from the engine speed sensor (RPM pick up). Make sure to make note the orientation of the bracket and the placement of the wire hold-down bracket. Place the sensor off to the side, making sure not to damage the sensor or the wires to the sensor.
- 10) Remove the engine vibration damper using a 15mm socket and 1/2 inch drive breaker bar.
- 11) Using a 10mm socket, remove all the gear cover bolts. Two of these bolts are 8mm and it is best to use a wrench, as these bolts are for the engine speed sensor. Note there are long and short bolts; they will need to be put in the proper locations when reinstalled. Remove the gear cover.
- 12) Locate the dowel pin and look to see if it is fully seated. Most of the pins will be flush with the gear housing or just below flush if they have not backed out. If the pin seems to be backed out find a small punch. With a hammer and punch tap on the head of the dowel pin and drive it into the block as far as possible.

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- 13) Lucky step 13! Time to install the special egg-washer, preventive maintenance part. Locate the 10mm bolt next to the dowel pin and remove it, reinstall the longer bolt using the special washer supplied in the kit. This washer will prevent the dowel pin from backing out. Apply loctite high strength (red) thread locker to the threads and torque the bolt to 18 ft. lbs. torque.
- 14) Using a gasket scraper, clean the gear housing gasket surface and the gear housing cover.
- 15) Remove the crankshaft oil seal from the gear cover using a punch or seal driver. Located in the kit is a new crankshaft seal, seal driver, crankshaft seal starter and a dust shield. Install the new crankshaft seal in the gear housing cover applying loctite to the outside of the seal. Using the seal driver, install the new seal in the gear housing cover making sure it is square in the opening. Clean all oil residues from the gear housing cover and gear housing gasket surface and any old gasket material. Apply a light coating of RTV or an oil resistant weather trim adhesive to the gasket surface area of the gear housing cover and place the new gasket on in the proper orientation. Clean all oil off the front of the crankshaft. The new Teflon seal must be installed on a clean dry surface. Using the crankshaft seal starter in the new seal, place the gear housing onto the front of the engine, push the gear housing cover over the crankshaft nose, and remove the seal starter from the crankshaft. Start a couple of bolts to hold cover in place.
- 16) Reinstall the gear cover bolts and torque to 18 ft. lbs.
- 17) Reinstall the four (15mm) engine dampener bolts and torque bolts to 92 ft. lbs.
- 18) Reinstall the engine speed sensor. Set the sensor-to-vibration damper air gap to 0.49 in. minimum to 0.51 in. maximum. Make sure that the two notches in the damper aren't under the sensor when setting the air gap, tighten and torque the mounting nuts to 18 ft. lbs. and remove the feeler gauge.

- 19) Reinstall the fan and fan support bracket along with the fan shroud. The torque value for the four 10mm fan shroud bolts is 18 ft. lbs. Once the fan is in place the fan shroud can be installed. Again, it is nice to have assistance as you carefully lower the fan/fan support into place.
- 20) Reinstall the windshield washer tank to the fan shroud.
- 21) Reinstall the engine accessory drive belt according to the diagram on the front radiator support of your truck.
- 22) Check around the engine compartment and make sure all tools and equipment are clear of any moving parts and test start the engine. Check for any oil leaks and to make sure the engine drive belt is running straight. Correct any oil leaks or drive belt problems before driving the truck.

Thanks to the folks at TST for allowing us to take excerpts from their detailed installation instructions.

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This is an innovative shop tool developed by TST to remove 12-valve injectors.



Another shop trick: testing a 24-valve fuel delivery pump is easy with the correct wiring harness and jumper leads that go directly to a 12-volt battery.