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Revised Cylinder Head Gasket and Head Bolts for 1983-92 Ford 2.3L OHC

Oil leaks and broken cylinder head bolts may occur if the head bolts are not properly tightened. The newest level of cylinder head gasket and cylinder head bolts are recommended any time cylinder head service is performed. The new cylinder head gasket and bolts require a different service procedure for all 1992 and earlier 2.3L engines. If cylinder head service is required refer to the following procedures for cylinder head gasket replacement and cylinder head bolt "Torque Plus Angle" steps to provide more uniform sealing.

The new head gasket and bolts are uniquely different from the production designed parts. Because of the difference, the new cylinder head bolts are the only bolts that can be used with the new head gasket. If a previous head gasket is to be used, or if head bolts are not available for the new gasket, the previous head gasket and bolts must be used. Failure to properly torque the cylinder head gasket can lead to an improper sealing surface, which can result in a leaking condition and broken head bolts.

• With the cylinder block and head properly prepared, install the new head gasket. The camshaft must be properly positioned to ensure proper timing alignment.

• Install all 10 head bolts into the block, finger tight.

• Use the new "Torque Plus Angle" procedure as follows only for new head gasket and bolts.

• Tighten all 10 cylinder head bolts in sequence shown in service manual to 51 ft.lbs. (70 Nm).

• Retighten all 10 head bolts in sequence to 51 ft.lbs. (70 Nm).

• Tighten all 10 head bolts in sequence an additional 90-100°

Diagnosing Ticking Noises in 2005-'08 3.0L Ford Duratec Engines

There have been some complaints of a ticking noise in the left bank cylinder head engine area in certain late model Ford Duratec engines. Refer your engine installer to the following service procedure to identify and resolve the issue.

Engines affected: 2005-'08 Ford 3.0L 4V Duratec engine with exhaust camshaft-driven water pumps.

Service Procedure:

To diagnose, with the engine running and warm (at normal operating temperature), use a mechanic's stethoscope to determine if the ticking noise is coming from the left-hand exhaust camshaft at cylinder #6 (see **Figure 1**, below). If the ticking noise can be verified, refer to the following instructions.

For 2008 Escape and Mariner applications, check the date on the left-hand cam cover engine label. If the engine build date is 5/16/2007 or before, refer to the following to identify and resolve the engine ticking noise. For engines built after this date, this procedure does not apply.

For 2007 Fusion and Milan applications, check the date on the front cover label. If the engine build date is 5/9/2007 or before, refer to the following to identify and resolve the engine ticking noise. For engines built after this date, this procedure does not apply.

1) Remove the left-hand camshaft cover.

2) Rotate the engine clockwise until the #6 cylinder exhaust cam lobes are pointing up and the valves are fully closed.

3) Remove all left-hand exhaust cam caps individually and reinstall them finger tight.

4) Torque bolts in sequence as shown in **Figure 2**, below, to 72 in.lbs. (8 Nm), excluding #4L camshaft cap.

5) Using a screwdriver positioned on each side of the top of cam cap #4L (see

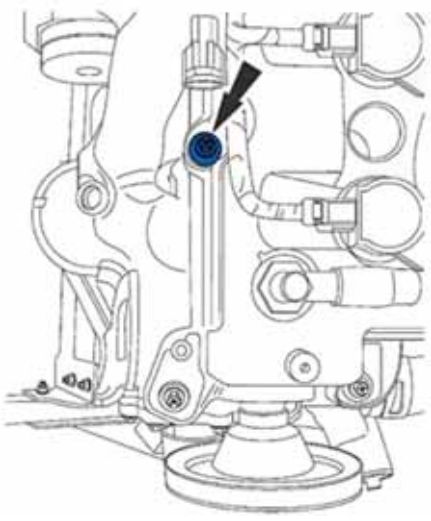

Figure 1 *Verify the ticking noise is coming from the left-hand exhaust camshaft at cylinder #6.*

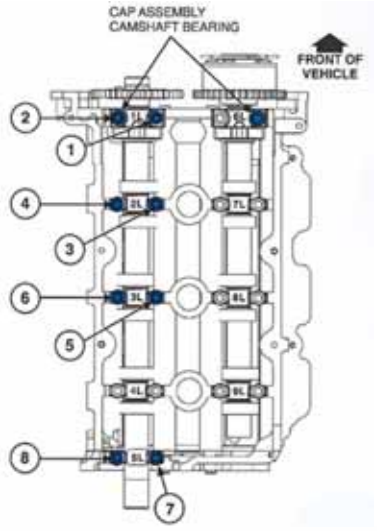

Figure 2 *Torque bolts in sequence to 72 in.lbs., excluding cam cap #4L camshaft cap.*

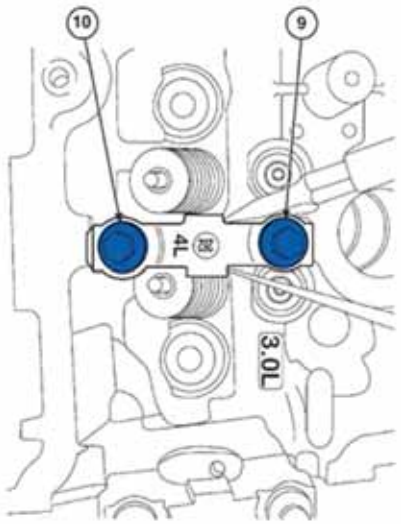

Figure 3 *Torque fastener #9 (inboard) first, to 72 in.lbs., then torque fastener #10.*

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Figure 2 page 12), apply hand pressure and shift cam cap #4L toward the exhaust side of the cylinder head.

6) While holding cam cap #4L in the shifted position, torque fastener #9 (inboard) first, to 72 in.lbs.. (8 Nm), then torque fastener #10 (**Figure 3**, page 12).

7) Install the left-hand camshaft cover.

8) Fully warm the engine to verify the repair.

– *From Mitchell 1*

1997-2008 Ford 3.8L, 3.9L and 4.2L Spark Knock Under Light Load and Acceleration

Some Ford vehicles equipped with 3.8L, 3.9L or 4.2L engines with Split Port Intake Manifold Runner Control (IMRC) may exhibit spark knock under light load and acceleration. Follow the service steps to correct this condition.

Inspect for disconnected IMRC actuator rods.

1) Check both right hand and left hand side IMRC rods to be sure they are properly attached to the actuator motor and intake manifold runner.

2) If the IMRC actuator rods are found to be connected properly, do not continue with information.

3) If any IMRC actuator rods are disconnected, refer to service manual.

4) If any IMRC actuator rod linkages are found disconnected, replace all four linkage rod retainers (**Figure 4**, below).

Ford 4.6L/5.4L Engine Crank Trigger Wheel Interchangeability

Back in 2001 on the 4.6L (although this is a split year) and in 2002 on the 5.4L, Ford made some changes to the timing gear set, specifically the crankshaft gear (the two-piece gears seen in the early years have all been replaced by the one-piece). There was a shorter gear set used prior to the dates listed above and a longer gear after those dates (see **Figure 5**, below).

The crank position trigger wheel changed as well. The early wheel that goes with the short gear is a PM trigger that has a spacer flange cast right into it. The later wheel, which is stamped steel, is flat and used with the tall gear.

While they are identical to each other in location and number of cogs, the stamped steel wheel is much less expensive to manufacture than the PM unit. Together they equal the same thing, only one is cheaper to manufacture.

Anytime you're looking to purchase the timing components for a complex DOHC engine such as the 4.6L or 5.4L, it is always less expensive to do so as a complete set. However, to this point we are unaware of anyone in the aftermarket manufacturing the timing set with the late tall crankshaft gear. Therefore you need to buy the early set and substitute the new style tall crank gear into it – which is still cheaper than buying all the parts separately. However, if you hit the 4.6L in 2001 (the split year) you could end up with the late gear and the early crank position trigger, or vice versa, neither of which will work in combination.

The later crank trigger ring is only available from Ford and costs about $26, and the later timing gear is around $20. However, the early crank trigger rings seem to be floating around everywhere. So why bother with the later gears at all? The crank position sensor only knows air gaps, not stamped steel or PM trigger wheels.

If you have an abundance of the early crank position sensor trigger wheels then you don't have to buy the later timing gear at all if you provide the trigger ring with the engine upon selling it.

So if you're having this issue in your facility, go on a treasure hunt and see what you can find in the way of the early crank position sensor trigger ring.

– *From Roy Berndt's EngINtel Column*

2008-Up 6.4L Ford Powerstroke Diesel Exhaust Service Tips

Another issue that an installer should be aware of, pertains to the exhaust tips found on the 2008-and-up F-Super Duty diesels.

These exhaust tips should not be removed or covered with dress sleeves that will seal off the ports on the sides (see **Figure 7,** page 15). As you can see, the new generation of diesel engines from all makes will have some odd-

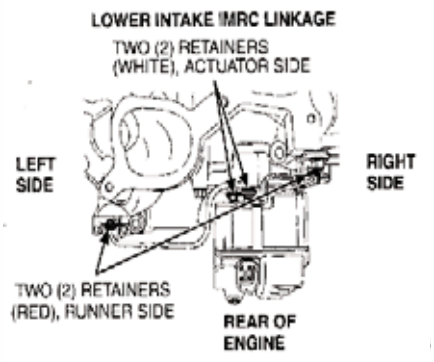

Figure 4 *If any actuator rod linkages are found disconnected, replace all four linkage rod retainers.*

Figure 5 *A shorter gear set was used prior to 2001/'02 and a longer gear after those dates.*

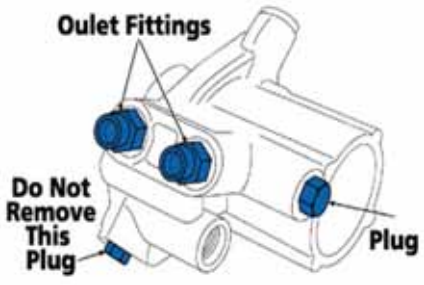

Figure 6 *7.3L engines may leak at the high-pressure oil pump outlet fittings and/or end plug.*

looking exhaust tips on them.

The tips are designed to draw cool air into the tip, by use of venturi action, to cool the exiting gases during filter regeneration.

During filter regeneration mode, the exhaust temperatures are more intense than normal. Without the special tips, the exiting gases become hazardous to the paint on the truck's body, dry grass that might catch fire or someone's legs who happens to be standing too close to the tail pipe.

Filter regeneration mode – another new technology advancement that the independent tech needs to understand – will be something you'll see more and more in your shops.

Starting last year, the U.S. Environmental Protection Agency (EPA) threw the diesel manufacturers a curve ball. As part of the new regulations, these engines now have to be equipped with a particulate filter after the catalyst. The job of the filter is to trap soot. Periodically, the PCM performs a regeneration on the filter.

During regeneration mode, raw fuel is injected into the filter to literally burn the soot out of the filter. The soot is reduced to ash and drops to the bottom of the filter. The ash never leaves the particulate filter assembly, and eventually, the filters will need to be replaced. In time, this will open a new service market as these filters start needing replacement.

If your shop happens to do diesel work, be advised also that these trucks are extremely tight under the hood and cab removal is required to do most repairs beyond basic maintenance on the Powerstroke V8 engines.

Tech Tip courtesy of Glen Beanard, ASE-certified master auto technician, and ASE service consultant.

Diagnosing Oil Leaks on 7.3L Super Duty Diesel Engines

You may have experienced an oil leak around the oil pump outlet fittings on Ford's 7.3L Super Duty diesel truck engines, specifically, some 1998-2003 E-Series, 1999-2003 Super Duty, 2000-'03 Excursion and 2000-'03 F-650/750 vehicles equipped with a 7.3L diesel engine may exhibit an oil leak at the high-pressure oil pump outlet fittings and/or end plug.

Figure 7 *These exhaust tips should not be removed or covered with dress sleeves that will seal off the ports on the sides.*

According to Ford, this type of leak may appear to be a rear main crankshaft seal, oil pan gasket or other engine oil leak due to the drain hole machined in the crankcase valley which allows any oil in the valley to run down the back of the engine (see **Figure 6**, page 14).

High-pressure oil pump leaks at the outlet fittings and/or end plug can be serviced without removing the pump assembly. Replace the

O-rings on the fillings and the end plug using kit 2C3Z-9G804-AA. All three O-rings should be replaced. Apply liquid thread sealer (included in the kit) prior to reinstallation.

Note: Do not remove the bottom plug on the oil pump – it is sealed in a different manner. **TSG**

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