Rod P/N	Design	Bolt Tightening Procedure
2W-9818	Conventional	35-45 ft.lbs. plus 55-65° turn
213-3193	Fractured	48-56 ft.lbs. plus 115-125° turn

Chart 1 *Fractured rod replacements for 1989-2005 Caterpillar engines.*

New Fractured Connecting Rod For 1989-2005 Caterpillar C7, 3114, 3116 & 3126 Engines

There is a new fractured rod available for 1989-2005 Caterpillar C7, 3114, 3116 and 3126 engines from Caterpillar dealers as a replacement part.

Caterpillar says the new fractured connecting rod is a product improvement and offers many advantages which include:

• Being able to accept higher loads directly because of the clearly matched joint surfaces.

• The fractured surface of the connecting rod and cap allows easier assembly of the rod and cap.

• Eliminates the need for a locating dowel.

• Eliminates fretting on the joint surfaces.

• Improves the quality of the machining process because of reduced machining steps and a controlled machining process.

• The machining process is further enhanced by the fracture machine, which incorporates automatic insertion of the connecting rod bolts and fastening equipment for the connecting rod bolts. This eliminates mismatch of connecting rod and cap components.

This fractured rod (p/n 213-3193) can be used as a replacement for any of these engines and can be intermixed with earlier style rods within an engine. There is one important difference when using the new rod: it requires a different tightening procedure and torque value than the previous rod (p/n 2W-9128). See **Chart 1**, above, for details.

Main Bearing Bolt Torque Caution On '97-2005 Cummins ISX Signature 600 Series Engines

The AERA Technical Committee offers the following caution for main bearing torque on Cummins ISX Signature 600 Series engines. Depending on when the engine was manufactured, the torque on the main bolts is different. Refer to the information below for the correct torque value.

Engines that were manufactured up to engine serial number 79012120 can be identified with the letters "USA" (**Figure 2**, below) included in the stamping located just below the water pump. The torque value for those main bearing cap bolts is 110 ft.lbs. + 180°; use the sequence in **Figure 3** (below) for proper torque sequence.

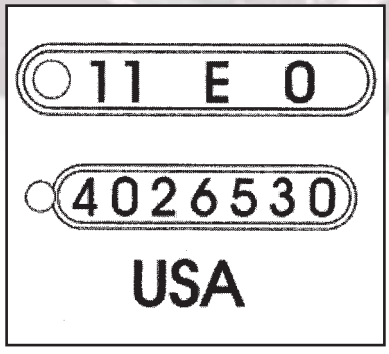

Figure 2 *Cummins ISX 600 engine identification stampings.*

Newer engines that were manufactured after serial number 79012120, can be identified by "MEX" and the pyramid mark stamped just below the water pump. The torque value for those main bearing cap bolts are 300 ft.lbs. + 90° using the sequence in Figure 3 for proper torque sequence.

Enhanced Top Liner Cooling On '86-2005 Detroit Diesel 60 Series Engines

The AERA Technical Committee offers the following information regarding an enhanced top liner cooling on Detroit Diesel 60 Series engines. This feature, an option at the time of purchase, shown in **Figure 4**, page 32, was introduced to increase cooling to the top of the liner with serial number 6R59715.

To provide the benefits of the top liner cooling to engines built prior to 1994, a kit to retrofit these blocks is available (p/n J39582). Carefully follow the following procedure when converting a non-top liner cooling block to a top liner cooling block.

1) Assemble the scallop cutting unit together by mounting the feed unit to the base plate with screws supplied.

2) Install bronze washer on the feed unit shaft and attach cutter holder assembly to shaft. When installing the carbide

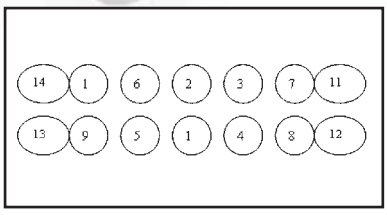

Figure 3 *Main bearing torque sequence for Cummins ISX 600 engines.*

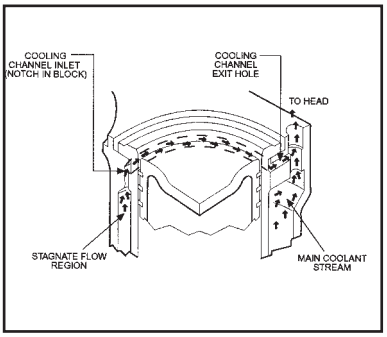

Figure 4 *Enhanced top liner cooling feature on Detroit Diesel 60 Series engines.*

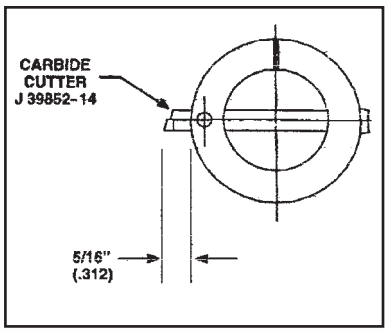

Figure 5 *Install bronze washer on the feed unit shaft and attach cutter holder assembly to shaft.*

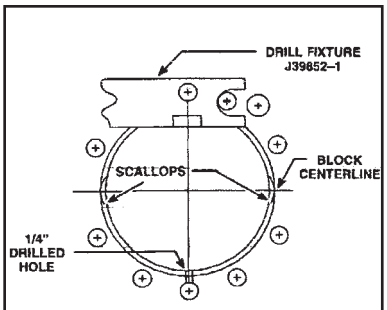

Figure 6 *Rotate the mounting plate 180° until it lines up with the next set of cylinder head bolt holes*

cutter into the holder, position it as shown in **Figure 5**, above.

Steps 3-8 are for machining two scallops 180° apart in each cylinder liner counterbore.

3) Lower the cutting mechanism by moving the control lever on the side of the power unit to its disengaged position.

4) Mount the power unit on the cylinder block and the cylinder liner counterbore. The power unit mounting plate has two locating holes which line up with corresponding cylinder head bolts in the block. Use the two bolts and washers supplied to secure the drive unit to the block.

5) Move the control lever to the engaged position which allows the cutter to correctly feed into the work during machining.

6) Install the drive lug adaptor into the drill chuck and tighten. Mount the drive lug adaptor on the power unit.

7) Operate the drill motor in a counter clockwise rotation until the carbide cutter rises into the work and begins cutting the block. Continue machining until the cutter rests against the automatic stop.

8) Move the power unit drive lever to the disengaged position and by hand rotate the cutter away from the work. Remove the two mounting bolts and washers and rotate the mounting plate 180° until it lines up with the next set of cylinder head bolt holes as shown in **Figure 6**, above. Repeat steps until block is completely done.

Steps 9-11 are used for drilling two holes 180° apart in each cylinder liner counterbore.

9) Mount 1/4″ drill bushing guide on the engine block at the outboard edge of the cylinder liner counter bore. Mount the drill guide to the block using the two bolts and washers supplied. Holes in three cylinder liner counterbores may be drilled before repositioning the drill bushing guide.

10) Place drill extension guide in the water jacket hole located at the opposite outboard side of the block. This will help in correctly aligning the drill extension and drill in the bushing guide and prevent binding.

11) Insert drill extension with a 1/4″ drill into the drill chuck and tighten. While resting the drill extension in the drill guide, insert the drill into the bushing and drill the hole. Make sure the drill does not break out beyond the counterbore and go through the outside casting wall. Repeat steps until two holes have been drilled in the sidewall of each counterbore for a total of twelve holes.

Push Rod Identification, Removal and Installation For 1992-2000 GM 6.5L VIN F & S Diesel Engines

There has been some confusion about proper push rod removal and installation for 1992-2000 GM 6.5L VIN F and S diesel engines during re-assembly of valve train components, according to the AERA Technical Committee.

The push rod design has different hardness requirements for each end, therefore, the installation of each push rod must be carefully monitored during assembly. The rocker arm end incorporates greater stresses, thus requiring increased hardness as compared to the end.

If the original push rods are being reused they must be installed in the same position as they were removed. A paint stripe or copper coloring identifies the upper end of the push rod. If the paint stripe is not visible, mark the push rod on

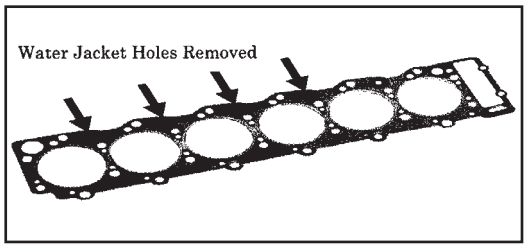

Figure 7 *The current head gasket design for Isuzu 7.1L engines has four blocked-off water coolant passages as compared to the original gasket.*

the upper end as the push rods are removed.

Aftermarket push rod tubes may not be marked as mentioned above, but, one end should be marked differently than the other. Those tubes are also manufactured to acceptable hardness values on both ends.

1) Install the valve pushrods with the copper-colored, painted or marked end upward.

2) Install the valve rocker arm shaft assembly. Improper installation of the valve rocker arm shaft bolts may cause valve rocker arm shaft breakage and piston-to-valve contact.

3) Install the bolts.

4) Rotate the crankshaft clockwise (from the front), until the mark on the crankshaft balancer is at the 2 o'clock position.

5) Rotate the crankshaft back counterclockwise 88 mm (3 1/2″), aligning the crankshaft balancer mark with the first lower water pump bolt, at approximately the 12:30 position.

6) This procedure will position the engine components so that no valves are completely open and close to a piston crown.

7) Install the rocker arm hold down bolts finger-tight.

8. Alternately tighten the bolts to 40 ft.lbs. (55 Nm).

9) Rotate the crankshaft in order to make sure that there is free-movement of the valve train.

Replacement Cylinder Head Gasket For 1994-2001 Isuzu 7.1L 6HE1-TC Diesel Engines

The AERA Technical Committee offers the following information on a replacement cylinder head gasket for 1994-2001 Isuzu 6HE1-TC 7.1L diesel engines. This information should be considered anytime the cylinder head has been removed from the block.

A new replacement cylinder head gasket for the 6HE1-TC diesel engine is currently available from the American Isuzu Parts Distribution Network (AIPDN). This new cylinder head gasket (p/n 8-94395-447-1), differs slightly from the original design. The difference between previous and the current gasket are very apparent visually and have prompted many questions from technicians who are re-assembling the engine. The current design, as shown in **Figure 7**, above, has four blocked-off water coolant passages as compared to the original gasket.

The holes were eliminated to improve coolant flow in the cylinder head and the new gasket replaces the original gasket p/n 8-94393-372-1.

When ordering a replacement cylinder head gasket, be sure to refer to the new part number listed in this bulletin. At the time of this publication AERA is unaware of an aftermarket source for this gasket.

Timing Gear Cover Revisions For 2004-2005 Mack E-Tech 12.0L Diesel Engines

The AERA Technical Committee offers the following information regarding a revised timing cover for 2004-2005 Mack E-Tech™ 12.0L diesel engines. This revision was made to strengthen the power steering pump mounting flange to help reduce breakage and cracking on certain applications, particularly for engines used in vehicles equipped with the heavier Vickers model V20 power steering pump.

To provide strength, additional metal was added to the power steering pump mounting flange on both the inside and outside of the timing gear cover. With this change, the timing gear cover part number has been changed to p/n 333GB5131BM.

The most noticeable feature of this new timing gear cover is the three strengthening ribs located at the bottom of the pump-mounting flange as shown in **Figure 8**, (page 34).

This revised timing gear cover was implemented into production early November 2004 for ASET™ AI/AMI engines and early December 2004 for ASET™ AC engines. The timing gear cover is also available through the Mack Parts System as a replacement for any existing cover that has cracked in the area of the power steering pump mounting flange on ASET and E-Tech engines.

Revised Push Rod For 2002-2004 Navistar/Ford 6.0L Diesel

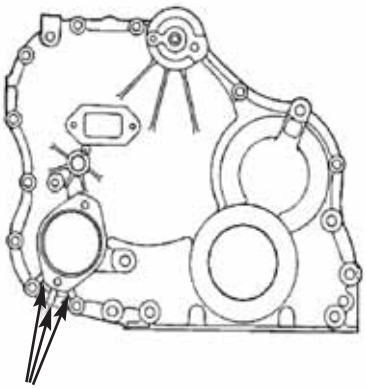

Figure 8 *Extra strengthening material was added to the Mack 12.0L timing cover.*

Engines

The AERA Technical Committee offers the following information regarding a revised push rod tube for 2002-2004 Ford/Navistar 6.0L diesel engines. Previously, the push rod tube had different ends and required correct orientation for proper service life.

To reduce the possibility of installing the pushrod tube upside down, a new pushrod assembly (p/n 1837730C2) has been designed. It replaces the old pushrod tube (p/n 1837730C1) which required specific positioning during installation.

Ball ends on push rod 1837730C1 were made from two different materials and required that this pushrod be installed with the copper colored end up, toward the top of engine.

New Part Number: 333GB5131BM
Description: Timing gear cover with strengthened power steering pump mounting flange, ASET™ AC, AI/AMI and E-Tech™ engines.
Replaces Part Number: 333GB5131AM

The ball ends on the new pushrod assembly are made from the same material. The new pushrod can be installed with either end up.

Revised Lower Thrust Main Bearings For 2000-2005 Navistar 7.6 & 8.7L Engines

The AERA Technical Committee offers the following information regarding a revised lower thrust bearing for 2000-2005 Navistar 7.6L and 8.7L diesel engines. Some service technicians have been confused while reassembling the crankshaft into engine blocks for the above engines because the lower thrust bearing shell has no locating lug.

This unwarranted confusion is the result of a revised bearing introduced with the model year 2000 engines. The new lower thrust main bearing (#7 position only) was released for production and service for ease of installation. The bearing was modified by removing the locking tab as depicted by the illustration in **Chart 2**, bottom.

The modified production and service bearing allows the lower thrust bearing to be installed and oriented in either direction (see **Figure 9**, above). Service bearing for lower main bearings 1-6 and crankcase (upper 1-7) continue to require bearings with the locking tab feature.

The modified bearing is interchangeable with engines released before the Model Year 2000 engines. Model Year 2000 engines are identified by serial number 1194039 and above. Service bearings are available in standard and three common undersizes. **EB**

Main Set Part No.	Description
1830726C91	Standard Crankshaft Bearing Package
1833361C91	.010" (.25 MM) Crankshaft Bearing Package
1833362C91	.020" (.50 MM) Crankshaft Bearing Package
1833363C91	.030" (.75 MM) Crankshaft Bearing Package

Chart 2 *Revised main bearing identification for Navistar 7.6L and 8.7L engines.*

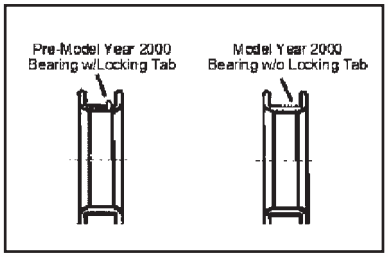

Figure 9 *Pre-2000 and revised main bearings for Navistar 7.6L and 8.7L engines.*