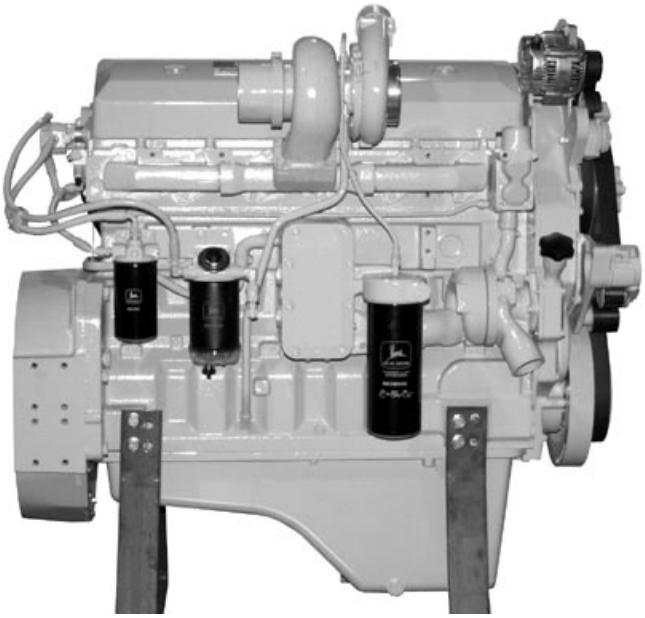
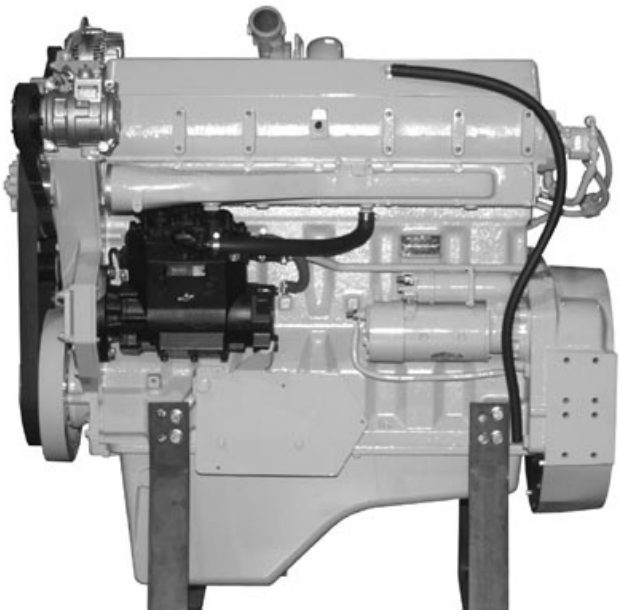
POWERTECH® 6105HF and 6125HF Engines



RG9030 –UN–21MAY98

Right Side View (Early Engine)



RG9031 –UN–21MAY98

Left Side View (Early Engine)

RG9032 –UN–21MAY98

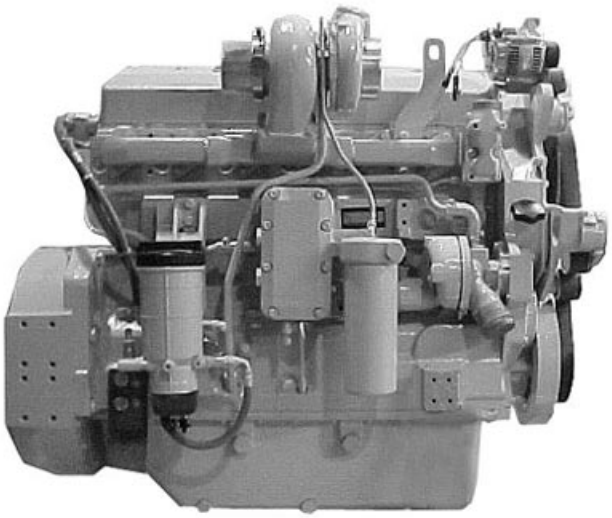
3/4 Right Front View (Early Engine)

RG9033 –UN–21MAY98

3/4 Left Front View (Early Engine)

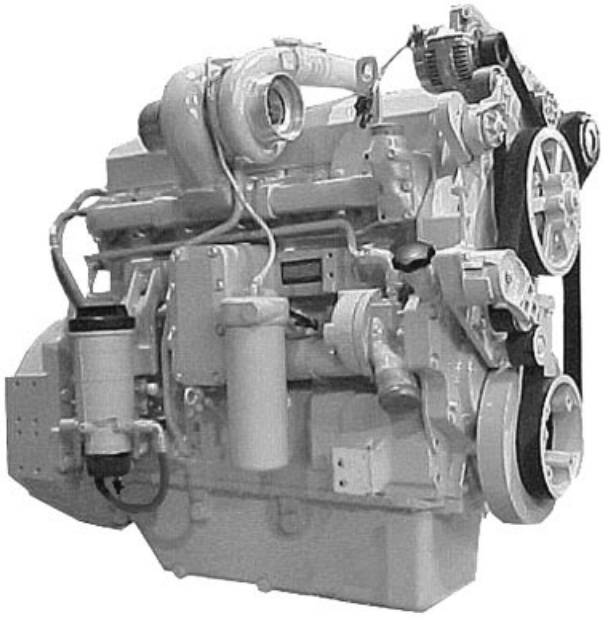
RG,RG34710,3 –19–06NOV00–1/1

POWERTECH® 6105ADW Engine—Continued



RG11171A –UN–03NOV00

Right Side View Later Engines S.N. (30000—)



RG11172A –UN–04DEC00

Right Front View Later Engines S.N. (30000—)

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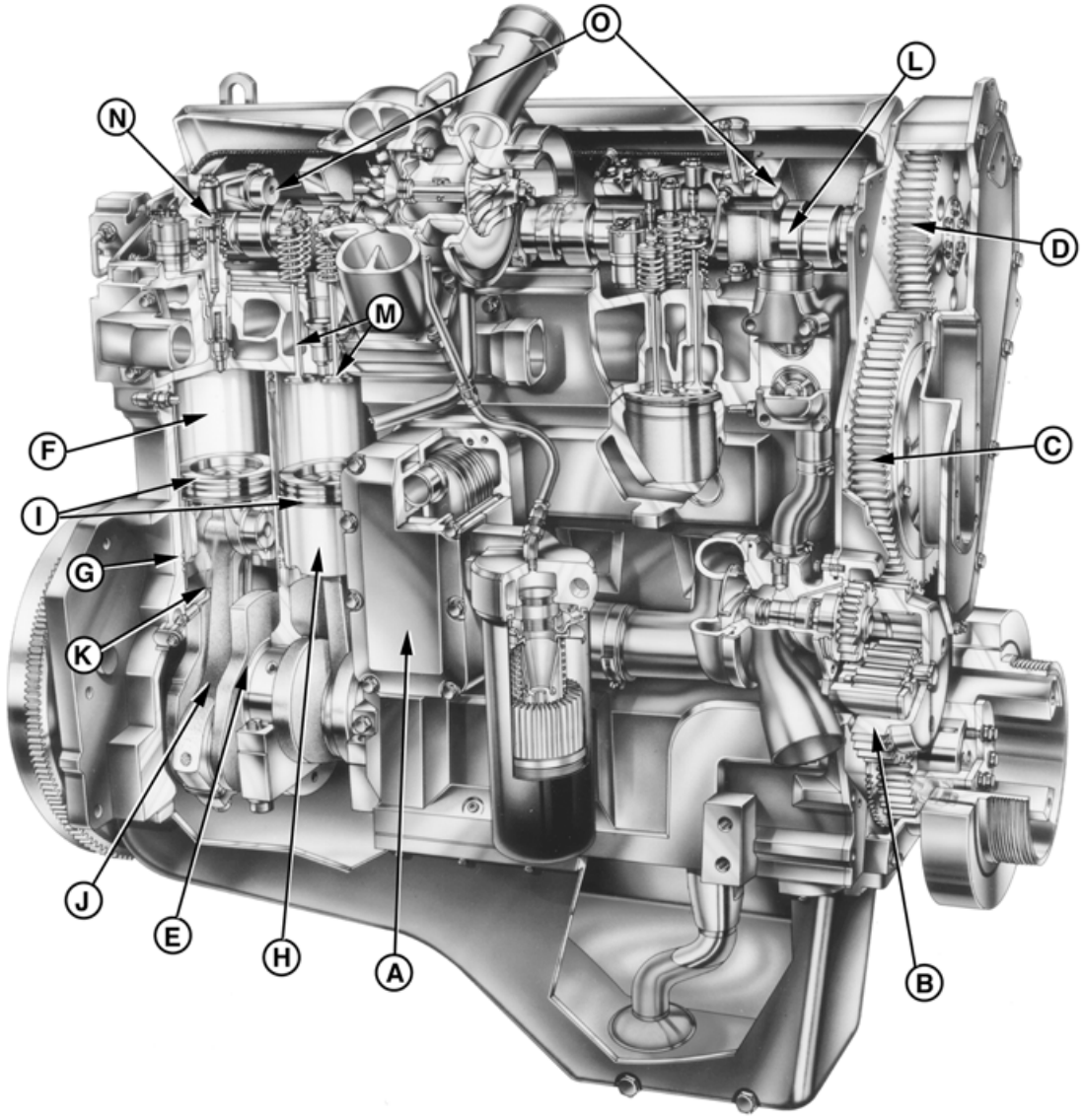
OUO1080,000028D –19–27AUG02–1/1

6105 and 6125 Engine Cutaway View



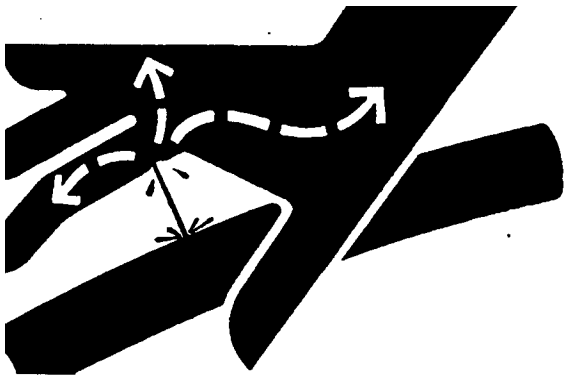
RG8435 –UN–12JUL99

Engine Cutaway View

A—Oil Cooler
B—Oil Pump Drive Gear
C—Idler Gear
D—Camshaft Gear
E—Crankshaft
F—Cylinder Liner
G—Cylinder Liner O-Rings
H—Piston
I—Piston Rings
J—Connecting Rod
K—Oil Spray Jet
L—Camshaft
M—Valves
N—Electronic Unit Injector
O—Two-Piece Rocker Arm Shaft

RG,RG34710,8 –19–30SEP97–1/1

Avoid High-Pressure Fluids



X9811 –UN–23AUG88

Escaping fluid under pressure can penetrate the skin causing serious injury.

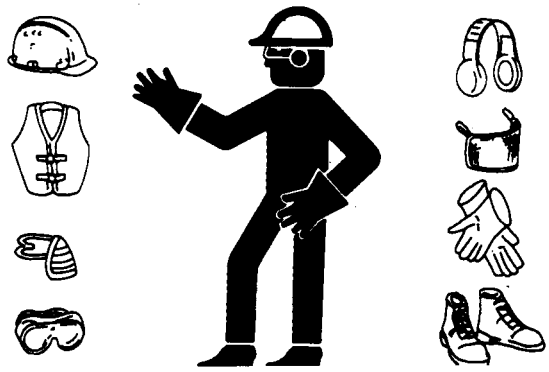
Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

DX,FLUID –19–03MAR93–1/1

Wear Protective Clothing



TS206 –UN–23AUG88

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

DX,WEAR –19–10SEP90–1/1

Engine Overhaul Guidelines

Engine life and performance will vary depending on operating conditions and the level of regular engine maintenance. Engines can be brought back to original performance standards through proper overhaul procedure and replacement of parts with genuine John Deere service parts. Overhauling the engine prior to failure can avoid costly repairs and downtime.

Consider installing a John Deere overhaul kit when:

- The engine begins to experience power loss and there are no known engine component failures.
- The engine is hard to start due to low cranking compression.
- The engine begins to smoke and there are no known engine component failures.
- The engine begins to use oil. Refer to Section 04 for acceptable oil consumption.
- The engine has high usage hours and the owner wants to take preventive measure to avoid high-cost repairs and costly downtime.

John Deere overhaul kits have a 1500-hour or 12-month warranty, whichever comes first. Installation labor is covered by warranty if an authorized John Deere dealer installed the overhaul kit and the replacement parts.

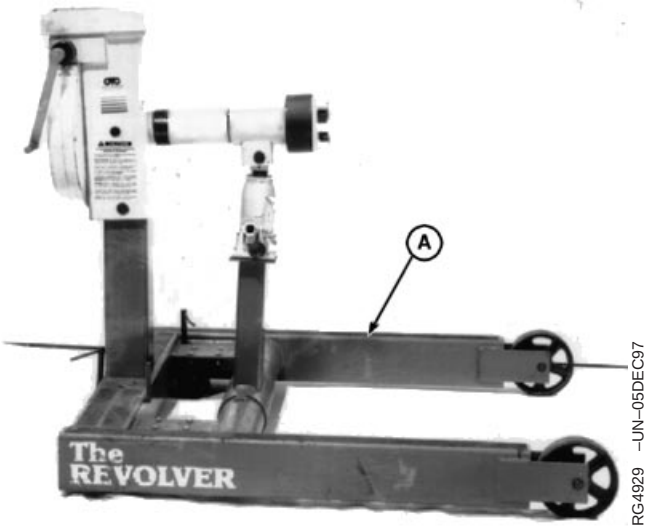
DPSG,OUO1032,3410 –19–15JUN00–1/1

Engine Repair Stand

NOTE: Only the 2722 kg (6000 lb) heavy-duty engine repair stand (A) No. D05223ST manufactured by Owatonna Tool Co., Owatonna, Minnesota is referenced in this manual. When any other repair stand is used, consult the manufacturer's instructions for mounting the engine.

Refer to machine technical manual for steps to remove engine from machine before installing it on repair stand.

A—Engine Repair Stand



RG4929 –UN–05DEC97

Engine Repair Stand

RG,RG34710,1043 –19–23OCT97–1/1

Check Electrical System

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace it last.

TS204 –UN–23AUG88

Prevent Battery Explosions

1. Clean batteries and cables with damp cloth. If corrosion is present, remove it and wash terminals with a solution of ammonia or baking soda in water. Then flush area with clean water.

2. Coat battery terminals and connectors with petroleum jelly mixed with baking soda to retard corrosion.

3. Test batteries. If batteries are not near full charge, try to find out why.

4. On low-maintenance batteries, check level of electrolyte in each cell of each battery. Level should be to bottom of filler neck. If water is needed, use clean, mineral-free water.

   If water must be added to batteries more often than every 250 hours, alternator may be overcharging.

NOTE: Water cannot be added to maintenance-free batteries.

5. If batteries appear to be either undercharged or overcharged, check alternator and charging circuit.

6. Check tension of drive belts. See operator's manual.

7. Check operation of starter motor and gauges.

NOTE: For test and repair of alternators and starter motors, see CTM77, Alternators and Starter Motors.

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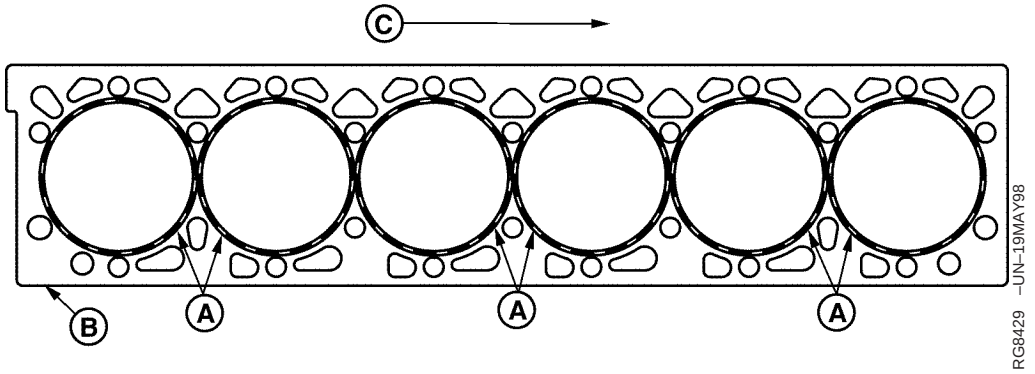
Head Gasket Inspection and Repair Sequence



Cylinder Head Gasket Inspection

A—Combustion Seals (Flanges) **B—Gasket Body** **C—Front of Engine**

The following inspection procedures are recommended whenever a head gasket joint failure occurs or when joint disassembly takes place.

1. Review historical data relating to machine operation, maintenance and repair, along with diagnostic observations. Note all areas requiring further inspection and analysis.

2. Remove rocker arm cover and check for presence of coolant in the oil.

3. Record head cap screw torques prior to removal. Upon removal, check cap screw length differences.

4. Remove cylinder head using appropriate lifting devices to prevent handling damage to head gasket. (See REMOVE CYLINDER HEAD in this group.)

5. Observe surfaces of removed head gasket.

   Examine combustion seals (A) for the following:

   - Flange severed/expanded/cracked/deformed.
   - Adjacent body area burned/eroded.
   - Fire ring severed/displaced/missing.
   - Flange sealing pattern eccentric/contains voids.
   - Discoloration of flange and adjacent body areas.
   - Flange surfaces rough/abraided/channelled.

   Examine gasket body (B) for the following:

   - Combustion gas erosion paths or soot deposits originating at combustion seals.
   - Extreme discoloration/hardening/embrittlement in localized areas.
   - Oil or coolant paths from port areas.
   - Localized areas of low compression.

6. Before cleaning components, inspect head, block, and liners for evidence of combustion gas and fluid leakage. Inspect cylinders and valve ports for unusual deposits.

7. Clean cylinder block. (See INSPECT AND CLEAN CYLINDER BLOCK in Group 030.) Clean cylinder head. (See CLEAN AND INSPECT CYLINDER HEAD in this group.) Clean liners. (See CLEAN CYLINDER LINERS in Group 030.)

8. Proceed with the following dimensional checks and visual inspections:

   - Cylinder Head (this group)
     – Check surface flatness/finish.
     – Inspect for surface damage.
     – Check cylinder head thickness, if resurfacing.
   - Cylinder Block and Liners (assembled and clamped) (Group 030)

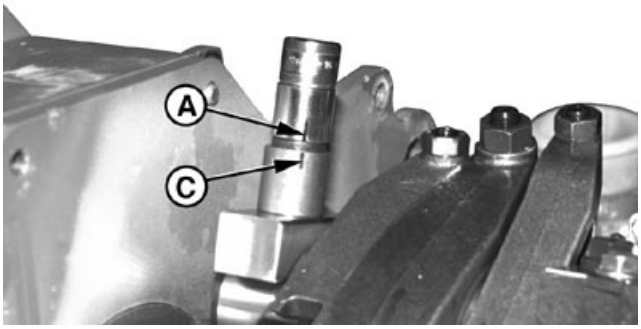
Continued on next page

Torque-Turn Rocker Arm Hold-Down Clamp Cap Screws on Engines with Dual Rail Fuel Systems

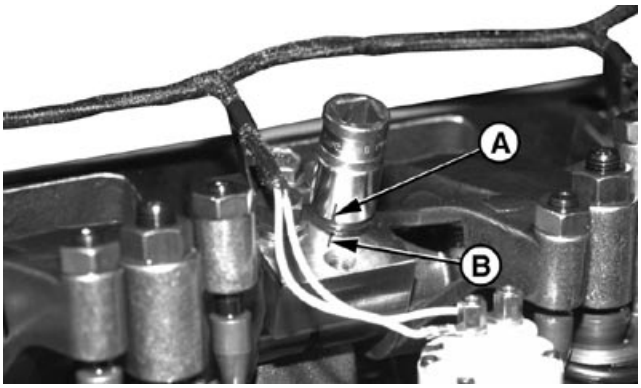
1. After applying initial torque of 30 N•m (22 lb-ft), start at front cap screw and proceed to the rear and torque-turn each cap screw 60° ± 5° as follows:

   - Position a **six point** socket onto rocker arm shaft clamp cap screw.
   - With clockwise tension on socket (viewed from rear of engine), mark a line (A) on socket and another aligning mark on shaft clamp (B) [or spacers (C) at each end location)].

   A—Line on Socket
   B—Line on Shaft Clamp
   C—Line on Spacer



Torque-Turn Clamp Cap Screws



Torque-Turn Clamp Cap Screws

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Recheck Cylinder Liner Standout (Height Above Block)

NOTE: If a new liner assembly is being installed in a new or used cylinder block, liner standout must be checked.

Be sure liner bore in cylinder block (B) and top deck of cylinder block are clean.

1. Install liners without O-rings and square packing. Secure with cap screws and washers, as outlined earlier in this group. (See REMOVE PISTONS AND CONNECTING RODS in this group.)

NOTE: Install liner with the identifying mark toward the front of the engine. Rotate 90° if pits or erosion exceed limits outlined during liner inspection.

2. Measure liner standout. (See MEASURE CYLINDER LINER STANDOUT earlier in this group.)

Specification

Cylinder Liner Standout—Height Above Block	0.030—0.117 mm (0.0012—0.0046 in.)

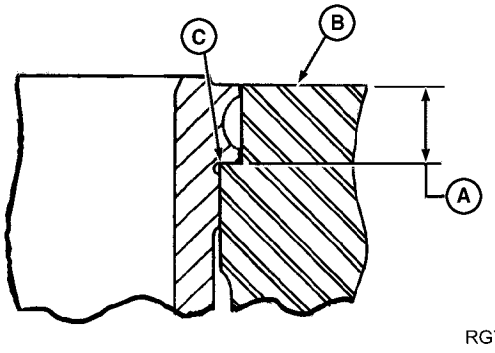
If liner standout is above specification, recheck liner support flange (C) for possible remaining burrs or incorrect counterbore depth (A) in block. If burrs are present, use respective liner and lapping compound to remove burr. Completely clean cylinder liner bore after lapping.

IMPORTANT: ONE LINER SHIM ONLY may be installed under any given liner flange.

If liner standout is below specifications, remove liner and install shim as needed to bring liner standout to within specification.

Specification

Cylinder Liner Shims Available—	
Thickness	0.05 mm (0.002 in.)
Thickness	0.10 mm (0.004 in.)



RG7142 –UN–05DEC97

Liner Counterbore Depth

RG8329 –UN–21MAY98

Measuring Liner Standout

A—Liner Flange Counterbore Depth
B—Block
C—Liner Support Flange

RG,RG34710,129 –19–30SEP97–1/1

Crankshaft Grinding Guidelines

IMPORTANT: Crankshaft grinding should be done ONLY by experienced personnel on equipment capable of maintaining crankshaft size and finish specifications.

If undersize bearings are used, check bearing clearance after bearing caps have been tightened to specified torque. If undersize bearings are too tight and clearance is not within specifications, the journal and bearing will be wiped clean of all oil. This would result in premature wear of parts.

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In addition to the standard size main and connecting rod bearings, the following undersize bearings are available.

Specification	
Crankshaft Main Bearings Available—Undersize	0.25, 0.50 mm (0.010, 0.020 in.)

If journals are tapered, out-of-round, scored or damaged, grind the crankshaft and install the proper undersize bearings.

If the crankshaft is to be reground, use the following recommended procedure:

1. Compare the crankshaft journal measurements taken during inspection and determine the size to which the journals are to be reground.
2. If one or more main or connecting rod journals require grinding, then grind all of the main journals or all of the connecting rod journals to the same required size.
3. All journal fillet radii must be free of any sharp grind marks or scratches. The fillet must blend smoothly into the journal and crank cheek. Check the radius with a fillet gauge.

IMPORTANT: Care must be taken to avoid localized heating which often produces grinding cracks.

4. Cool the crankshaft while grinding by using coolant generously. DO NOT crowd the grinding wheel into the work.

IMPORTANT: Grind crankshaft with journals turning clockwise, as viewed from the front end of crankshaft. Lap or polish journals in opposite direction of grinding.

5. Polish or lap the ground surfaces to the specified finish to prevent excessive wear of the journals.

NOTE: Production crankshafts are induction hardened and shotpeened at the factory. Field shotpeening is not recommended due to the equipment required and part geometry.

6. If the thrust surfaces of the crankshaft are worn or grooved excessively, regrind and polish. Maintain the specified radius between each thrust surface and the bearing journal. An oversize thrust washer set containing one standard washer and two 0.18 mm (0.007 in.) oversize washers is available. (See THRUST BEARING NEW PART SPECIFICATIONS, later in this group.)

NOTE: When thrust surfaces are reground and oversize washers used, crankshaft end play specification must be maintained to within 0.038—0.380 mm (0.0015—0.0150 in.). (See CHECK CRANKSHAFT END PLAY, earlier in this group.)

7. Stone the edges of all oil holes in the journal surfaces smooth to provide a radius of approximately 1.50 mm (0.060 in.).

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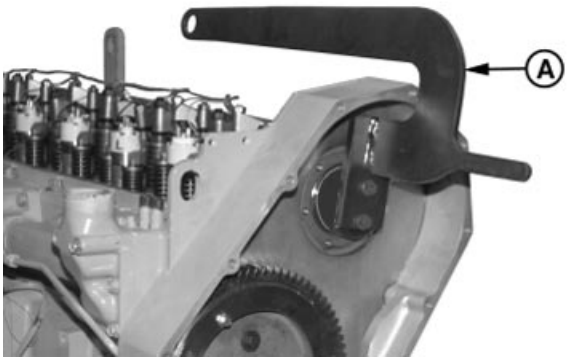
9. Remove JDG969A Camshaft Holder (A) from front face of camshaft.

A—JDG969A Camshaft Holder



RG10243 –UN–30JUL99

Removing JDG969A Camshaft Holder

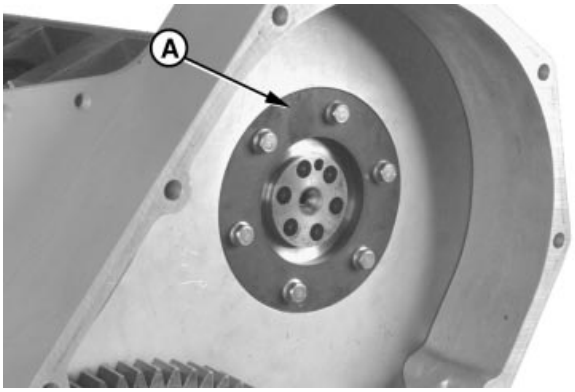
RG,RG34710,191 –19–25OCT00–11/14

10. Install a new thrust ring gasket. Lubricate O-ring with clean engine oil and install camshaft thrust ring (A) and tighten cap screws to specifications.

Specification

Camshaft Thrust Ring-to-Head—
Torque ..... 35 N•m (26 lb-ft)

A—Camshaft Thrust Ring



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Installing Camshaft Thrust Ring

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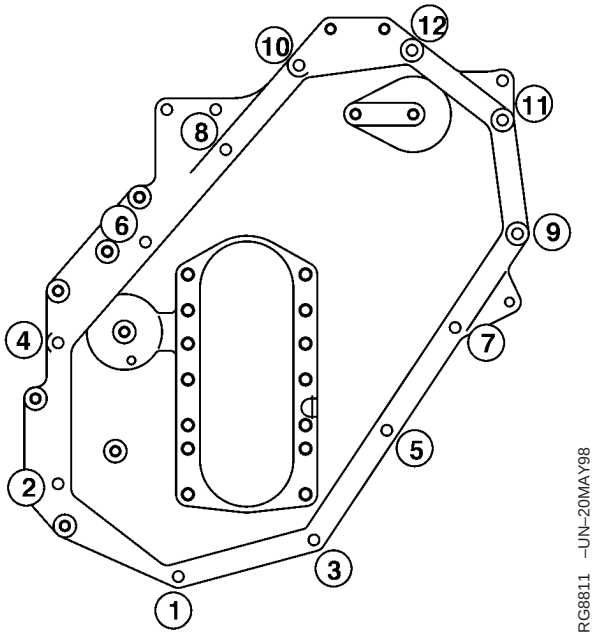
IMPORTANT: On engines with fixed pulleys, be sure the lower right access cover cap screw (3, in diagram on this page) is installed in the camshaft gear access cover before the pulley (A, figure on previous page) is pressed on. Otherwise, pulley will interfere with installation of this cap screw.

8. Apply clean engine oil to ID of fan hub/pulley (A, figure on previous page). Support end of shaft through pipe plug hole in bearing housing. Using a driver that bears on outside finished edge of hub, press hub onto other end of shaft until it bottoms against shoulder. Do not hammer fan hub onto shaft.

9. Install washer and cap screw. Tighten cap screw to specifications.

Specification	
Fan Drive Hub-to-Shaft—Torque	115 N•m (85 lb-ft)



Camshaft Gear Access Cover

On engines with dual pulleys, tighten pulley-to-pulley cap screws to the following specifications.

Specification	
Fan Pulley-to-Pulley Cap Screws—Torque	61 N•m (45 lb-ft)

10. On fixed fan drive and later adjustable fan drive assemblies, plug (I, figure on previous page) should be driven in flush to slightly recessed in rear surface of camshaft gear access cover.

11. On early adjustable fan drive assemblies, apply LOCTITE® 592 Pipe Sealant with TEFLON® (TY9480) to threads of pipe plug (H, figure on previous page). Install and tighten plug in bearing housing.

12. Install adjustable fan drive assembly onto engine and tighten cap screws to specifications.

Specification	
Adjustable Fan Drive-to-Camshaft Gear Access Cover Cap Screws—Torque	90 N•m (66 lb-ft)

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TEFLON is a registered trademark of Du Pont Co.

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Perform Axial Bearing End Play Test

This test will give an indication of the condition of the axial bearing within the center housing and rotating assembly.

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1. Mount magnetic base dial indicator so that indicator tip rests on end of shaft. Preload indicator tip and zero dial on indicator.
2. Move shaft axially back and forth by hand.
3. Observe and record total dial indicator movement and compare to following specification.

Measuring Axial End Play

Specification

Garrett Turbocharger Axial Bearing—End Play	0.025—0.114 mm (0.0010—0.0045 in.)
Borg Warner Turbocharger Axial Bearing—End Play	0.0635—0.1143 mm (0.0025—0.0045 in.)

f bearing end play is not within specification, replace urbocharger.

RG,RG34710,244 –19–03NOV00–1/1

Repair Turbocharger

Turbochargers used on the engines covered in this manual are available through service parts as a complete remanufactured assembly only. Individual components for repair are not available.

RG,RG34710,245 –19–30SEP97–1/1

About this Section of the Manual

This section of the manual contains necessary information to diagnose problems with the base engine lubrication and cooling systems. This section is divided into two areas: diagnosing malfunctions and testing procedures. The diagnosing malfunction areas are further divided into the following headings, containing the following symptoms:

- **(L)** Diagnosing Lubrication System Malfunctions:
  - L1 - Excessive oil consumption
  - L2 - Engine oil pressure high
  - L3 - Engine oil pressure low
- **(C)** Diagnosing Cooling System Malfunctions
  - C1 - Coolant temperature above normal
  - C2 - Coolant temperature below normal
  - C3 - Coolant in oil or oil in coolant

Procedures for diagnosing some of the above symptoms are formatted such that a test or repair is recommended, then based on the results another test or repair is recommended. Other symptoms are formatted in a symptom - problem - solution format. In these symptoms, the problems are arranged in the most likely or easiest to check first. Symptoms arranged in both formats refer to testing procedures in the second part of this section. The second part of this section of the manual contains the following testing procedures:

- Lubrications System Testing Procedures:
  - Check engine oil pressure
  - Check for excessive crankcase pressure (blow-by)
  - Check for turbocharger oil seal leak
- Cooling System Testing Procedures:
  - Inspect thermostat and test opening temperature
  - Pressure test cooling system and radiator cap
  - Check for head gasket failures
- Air Supply and Exhaust Systems Testing Procedures
  - Measure intake manifold pressure (turbo boost)
  - Check for intake and exhaust restrictions
  - Test for intake air leaks
  - Check for exhaust air leaks

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Lubrication System (Group 060) Other Material

Number	Name	Use
T43513 (U.S.) TY9474 (Canadian) 271 (LOCTITE®)	Thread Lock and Sealer (High Strength)	Oil filter mounting adapter-to-filter base.
T43512 (U.S.) TY9473 (Canadian) 242 (LOCTITE®)	Thread Lock and Sealer (Medium Strength)	Oil pump-to-block cap screws and oil pressure sending unit.
TY6333 or TY6347 (U.S.)	High Temperature Grease	Apply to inside cavities of oil pump and ID of oil pump drive gear bushing.
TY16285 (U.S.) CXTY16285 (Canadian) 7649 (LOCTITE®)	Clean and Cure Primer	Apply to oil pan and block sealing surfaces.
ΓY16021 (U.S.) ΓY9484 (Canadian) L7430 (LOCTITE®)	High Flex Form-In-Place Gasket	Used to seal oil pan.[1]
ΓY9375 (U.S.) ΓY9480 (Canadian) 592 (LOCTITE®)	Pipe Sealant	Apply to oil pan drain hose and drain valve.

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[1] See INSTALL ENGINE OIL PAN later in this group for specific locations to apply sealant.

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