DX55

SSS – PIN Number Z7NFP1001 and Above
EHSS – PIN Number Z7NFS1001 and Above

DX60
REPAIR MANUAL
COMPLETE CONTENTS

The following pages are the collation of the contents pages from each section and chapter of the DX55, DX60 Repair manual. Complete Repair part # 84140461.

The sections used through out all Case IH product Repair manuals may not be used for each product. Each Repair manual will be made up of one or several books. Each book will be labeled as to which sections are in the overall Repair manual and which sections are in each book.

The sections listed above are the sections utilized for the DX55, DX60 Tractors.

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SAFETY

PRECAUTIONARY STATEMENTS

A careful operator is the best operator. Most accidents can be avoided by observing certain precautions. To help prevent accidents, read the following precautions before operating this equipment. Equipment should be operated only by those who are responsible and instructed to do so.

Carefully review the procedures given in this manual with all operators. It is important that all operators be familiar with and follow safety precautions.

THE TRACTOR

1. Read the Operator's Manual carefully before using the tractor. Lack of operating knowledge can lead to accidents.
2. Use an approved roll bar and seat belt for safe operation. Overturning a tractor without a roll bar can result in death or injury. If your tractor is not equipped with a roll bar and seat belt, see your Case IH Dealer.
3. Always use the seat belt. The only instance when the seat belt should not be used is if the roll bar has been removed from the tractor or folding ROPS is in down position.
4. If a front end loader is to be installed, always use a FOPS (Falling Object Protective Structure) canopy to avoid injury from falling objects.
5. Use the handholds and step plates when getting on and off the tractor to prevent falls. Keep steps and platform cleared of mud and debris.
6. Do not permit anyone but the operator to ride on the tractor. There is no safe place for extra riders.
7. Keep all safety decals clean of dirt and grime, and replace all missing, illegible, or damaged safety decals. See the list of decals in the Decal section of this manual.

SERVICING THE TRACTOR

1. The cooling system operates under pressure which is controlled by the radiator cap. It is dangerous to remove the cap while the system is hot. Always turn the cap slowly to the first stop and allow pressure to escape before removing the cap entirely.
2. Keep any type of open flame away from the tractor and do not smoke while refueling. Wait for the engine to cool before refueling.
3. Keep the tractor and equipment, particularly brakes and steering, maintained in a reliable and satisfactory condition to ensure your safety and comply with legal requirements.
4. Keep open flame or cold weather starting aids away from the battery to prevent fires or explosions. Use jumper cables according to instructions to prevent sparks which could cause explosion. Do not use chemical starting aids on glow plug equipped tractors.
5. Stop the engine before performing any service on the tractor.
6. Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury. If fluid is injected into the skin, obtain medical attention immediately or gangrene may result.
   - DO NOT use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.
   - Stop the engine and relieve pressure before connecting or disconnecting lines.
   - Tighten all connections before starting the engine or pressurizing lines.
7. Do not modify or permit anyone else to modify or alter this tractor or any of its components or functions without first consulting a Case IH Dealer.
8. The fuel oil in the injection system is under high pressure and can penetrate the skin. Unqualified persons should not remove or attempt to adjust a pump, injector, nozzle, or any other part of the fuel injection system. Failure to follow these instructions can result in serious injury.
9. Continuous long-term contact with used engine oil may cause skin cancer. Avoid prolonged contact with used engine oil. Wash skin promptly with soap and water.

10. Some components of your tractor, such as gaskets and friction surfaces (brake linings, clutch linings, etc.) may contain asbestos. Breathing asbestos dust is dangerous to your health. You are advised to have any maintenance or repair on such components carried out by an authorized Case IH Dealer. However, if service operations are to be undertaken on parts that contain asbestos, the essential precautions listed below must be observed:
    - Work out of doors or in a well ventilated area.
    - Dust found on the tractor or produced during work on the tractor should be removed by extraction, not by blowing.
    - Dust waste should be dampened, placed in a sealed container, and marked to ensure safe disposal.
    - If any cutting, drilling, etc. is attempted on materials containing asbestos, the item should be dampened and only hand tools or low speed power tools used.

OPERATING THE TRACTOR

1. Before starting the tractor, apply the parking brake, place the PTO lever in the “OFF” position, the lift control lever in the down position, the remote control valve levers in the neutral position, and the transmission in neutral.
2. Always sit in the tractor seat when starting the engine or operating controls. Do not start the engine or operate controls while standing beside the tractor.
3. Do not bypass the neutral start switches. Consult your Case IH Dealer if your neutral start controls malfunction. Use jumper cables only in the recommended manner. Improper use can result in tractor runaway.
4. Avoid accidental contact with the gear shift lever while the engine is running, as this can cause unexpected tractor movement.
5. Before getting off the tractor, disengage the PTO, turn the engine off, and apply the parking brake. Never get off the tractor while it is in motion.
6. Do not park the tractor on a steep incline.
7. Do not operate the tractor engine in an enclosed building without adequate ventilation. Exhaust fumes can cause death or illness.
8. If the power steering or engine ceases operating, stop the tractor immediately.
9. Pull only from the drawbar or the lower link drawbar in the down position. Use only a drawbar pin that locks in place. Pulling from the tractor rear axle or any point above the axle may cause the tractor to upset.
10. If the front end of the tractor tends to rise when heavy implements are attached to the three-point hitch, install front end weights. Do not operate the tractor with a light front end.
11. Always set the hydraulic selector lever in position control when attaching or transporting equipment. Ensure hydraulic couplers are properly mounted and will disconnect safely in case of accidental detachment of implement.
12. Do not leave equipment in the raised position.
13. Use the flasher/turn signal lights and SMV signs when traveling on public roads both day and night (unless prohibited by law).
14. When operating at night, adjust lights to prevent blinding oncoming drivers.

DRIVING THE TRACTOR

1. Watch where you are going, especially at row ends, on roads, around trees and low hanging obstacles.
2. To avoid upsets, drive the tractor with care and at a safe speed. Use extra caution when operating over rough ground, when crossing ditches or slopes, and when turning corners.
3. To provide two-wheel braking, lock tractor brake pedals together when transporting on roads.
4. Do not coast or free wheel down hills. Use the same gear when going downhill as is used when going uphill.
5. Any towed vehicle with a total weight exceeding that of the towing tractor should be equipped with brakes for safe operation.
6. If the tractor becomes stuck or the tires become frozen to the ground, back up the tractor to prevent upset.
7. Always check overhead clearance, especially when transporting the tractor.
8. When operating at night, adjust lights to prevent blinding oncoming drivers.

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OPERATING THE PTO

1. When operating PTO driven equipment, shut off the engine and wait until the PTO stops before getting off the tractor and disconnecting the equipment.
2. Do not wear loose clothing when operating the power take-off or when near rotating equipment.
3. When operating stationary PTO driven equipment, always place range gear shift lever in neutral, apply the tractor parking brake, and block the rear wheels front and back.
4. To avoid injury, do not clean, adjust, unclog, or service PTO driven equipment when the tractor engine is running.
5. Ensure the PTO master shield is installed at all times. Always replace the PTO shield cap when the PTO is not in use.

DIESEL FUEL

1. UNDER NO CIRCUMSTANCES should gasoline, alcohol, or blended fuels be added to diesel fuel. These combinations can create an increased fire or explosive hazard. Such blends are more explosive than pure gasoline in a closed container such as a fuel tank. DO NOT USE THESE BLENDS.
2. Never remove the fuel cap or refuel with the engine running or hot.
3. Do not smoke while refueling or when standing near fuel.
4. Maintain control of the fuel filler pipe nozzle when filling the tank.
5. Do not fill the fuel tank to capacity. Allow room for expansion.
6. Wipe up spilled fuel immediately.
7. Always tighten the fuel tank cap securely.
8. If the original fuel tank cap is lost, replace it with a Case IH approved cap. A non-approved, proprietary cap may not be safe.
9. Keep equipment clean and properly maintained.
10. Do not drive equipment near open fires.
11. Never use fuel for cleaning purposes.
12. Arrange fuel purchases so that winter grade fuels are not held over and used in the spring.

SAFETY FRAME (ROPS)

Your Case IH tractor is equipped with a safety frame. It must be maintained in a serviceable condition. Be careful when driving through doorways or working in confined spaces with low headroom.

UNDER NO CIRCUMSTANCES should you:

- modify, drill, or alter the safety frame in any way. Doing so may render you liable to legal prosecution.
- attempt to straighten or weld any part of the main frame or retaining brackets which have suffered damage. Doing so may weaken the structure and endanger your safety.
- secure any parts on the main frame or attach your safety frame with anything other than the special high tensile bolts and nuts specified.
- attach chains or ropes to the main frame for pulling purposes.
- take unnecessary risks even though your safety frame affords you the maximum protection possible.

SECTION 10 – ENGINE

Chapter 1 – Engine Components

CONTENTS

SPECIFICATIONS

GENERAL	DX55	DX60
Engine Model	N844L-T	N844L-T
Number of Cylinders	4	4
Bore x Stroke	84 x 100 mm. (3.31 x 3.94in)	84 x 100 mm. (3.31 x 3.94in)
Displacement	135.2 cu. In.(2216 cc)	135.2 cu. In.(2216 cc)
Compression Ratio	22.5:1	22.5:1
Rated Speed (rpm)	2700	2800
Firing Order	1-3-4-2	1-3-4-2
Low Idle Speed	1000	1000
Maximum No Load Speed	2900	3000
Cylinder Arrangement	In-line vertical	In-line vertical
Valve Arrangement	Overhead	Overhead
Compression Pressure At 200 rpm (cylinder speed)	29.4 ± 3.5 bar (427 ± 50 psi)	29.4 ± 3.5 bar (427 ± 50 psi)
Gross Engine Power	41.0 kw (55 hp)	44.7 kw (60 hp)
PTO Power @ Engine Rated rpm	34.3 kw (46 hp) EHSS @ 589 PTO rpm	37.3 kw (50 hp) EHSS @ 610 PTO rpm
	35.0 kw (47 hp) SSS @ 589 PTO rpm	38.0 kw (51 hp) SSS @ 610 PTO rpm
CYLINDER BLOCK	N844L-T	N844L-T
Bore		
Standard	84.0 mm (3.3071 in)	84.0 mm (3.3071 in)
Maximum	84.2 mm (3.315 in)	84.2 mm (3.315 in)
Head Surface Warp		
Standard	.05 mm (.002 in)	.05 mm (.002 in)
Maximum	.12 mm (.005 in)	.12 mm (.005 in)
CYLINDER HEAD	N844L-T	N844L-T
Head Warp		
Standard	.05 mm (.002 in)	.05 mm (.002 in)
Maximum	.12 mm (.005 in)	.12 mm (.005 in)
Valve seat width		
Standard	1.7-2.1 mm (0.067-0.082 in)	1.7-2.1 mm (0.067-0.082 in)
Maximum	1.8 mm (0.071 in)	1.8 mm (0.071 in)
Valve seat sink	N844L-T	N844L-T
Standard (recess)	0.85-1.15mm (0.0334-0.0453 in)	0.85-1.15mm (0.0334-0.0453 in)
Maximum	1.8 mm (0.071 in)	1.8 mm (0.071 in)
Valve Angle	45 degrees	45 degrees
PISTON	N844L-T	N844L-T
Diameter		
Standard	83.948-83.963 mm (3.30503-3.30562 in)	83.948-83.963 mm (3.30503-3.30562 in)
Minimum	83.7 mm (3.2953 in)	83.7 mm (3.2953 in)
BORE CLEARANCE	N844L-T	N844L-T
Standard	0.038-0.072 mm (0.0015-0.0028 in)	0.038-0.072 mm (0.0015-0.0028 in)
Maximum	0.25mm (0.010 in)	0.25mm (0.010 in)

PISTON PIN BORE	N844L-T	N844L-T
Standard	27.996-28.0mm (1.102-1.1023 in)	27.996-28.0mm (1.102-1.1023 in)
Maximum	27.98 mm (1.102 in)	27.98 mm (1.102 in)
PISTON PIN CLEARANCE	N844L-T	N844L-T
Standard	-0.001 +0.007mm (-0.00004 +0.0003)	-0.001 +0.007mm (-0.00004 +0.0003)
Maximum	0.02 mm (0.0008 in)	0.02 mm (0.0008 in)
PISTON PIN	N844L-T	N844L-T
Diameter		
Standard	27.996-28.0 mm (1.1022-1.10236 in)	27.996-28.0 mm (1.1022-1.10236 in)
minimum	27.98 mm (1.1016 in)	27.98 mm (1.1016 in)
PIN TO BUSHING CLEARANCE		
Standard	0.01-0.025 mm (0.00039-0.00098 in)	0.01-0.025 mm (0.00039-0.00098 in)
Maximum	0.08mm (0.0031 in)	0.08mm (0.0031 in)
PISTON RING	N844L-T	N844L-T
END GAP		
1st Ring	0.2-0.35 mm (0.008-0.0138 in)	0.2-0.35 mm (0.008-0.0138 in)
Maximum	1.0 mm (0.039 in)	1.0 mm (0.039 in)
2nd Ring	0.20-0.40 mm (0.008-0.016 in)	0.20-0.40 mm (0.008-0.016 in)
Maximum	1.0 mm (0.039 in)	1.0 mm (0.039 in)
Oil Ring	0.20-0.80 mm (0.008-0.0315 in)	0.20-0.80 mm (0.008-0.0315 in)
Maximum	1.2 mm (0.047 in)	1.2 mm (0.047 in)
COMPRESSION RING TO GROOVE CLEARANCE		
Standard (1st Ring)	0.7-0.11 mm (0.027-0.004 in)	0.7-0.11 mm (0.027-0.004 in)
2nd Ring	0.04-0.08 mm (0.0016-0.0031 in)	0.04-0.08 mm (0.0016-0.0031 in)
Maximum	0.25 mm (0.010 in)	0.25 mm (0.010 in)
OIL RING TO GROOVE CLEARANCE		
Standard	0.03-0.13 mm (0.001-0.00512 in)	0.03-0.13 mm (0.001-0.00512 in)
Maximum	0.25 mm (0.010 in)	0.25 mm (0.010 in)
RING WIDTH		
1st compression ring	2.0 mm (0.079 in)	2.0 mm (0.079 in)
2nd compression ring	1.5 mm (0.059 in)	1.5 mm (0.059 in)
Oil compression ring	4.0 mm (0.157 in)	4.0 mm (0.157 in)
CONNECTING ROD	N844L-T	N844L-T
ROD TWIST		
Standard	0.08 mm (0.003 in)	0.08 mm (0.003 in)
Maximum	0.2 mm (0.008 in)	0.2 mm (0.008 in)
ROD BEND		
Standard	0.05 mm (0.002 in)	0.05 mm (0.002 in)
Maximum	0.15 mm (0.006 in)	0.15 mm (0.006 in)
ON CRANKSHAFT SIDE PLAY		
Standard	0.1-0.3 mm (0.004-0.012 in)	0.1-0.3 mm (0.004-0.012 in)
Maximum	0.7 mm (0.028 in)	0.7 mm (0.028 in)

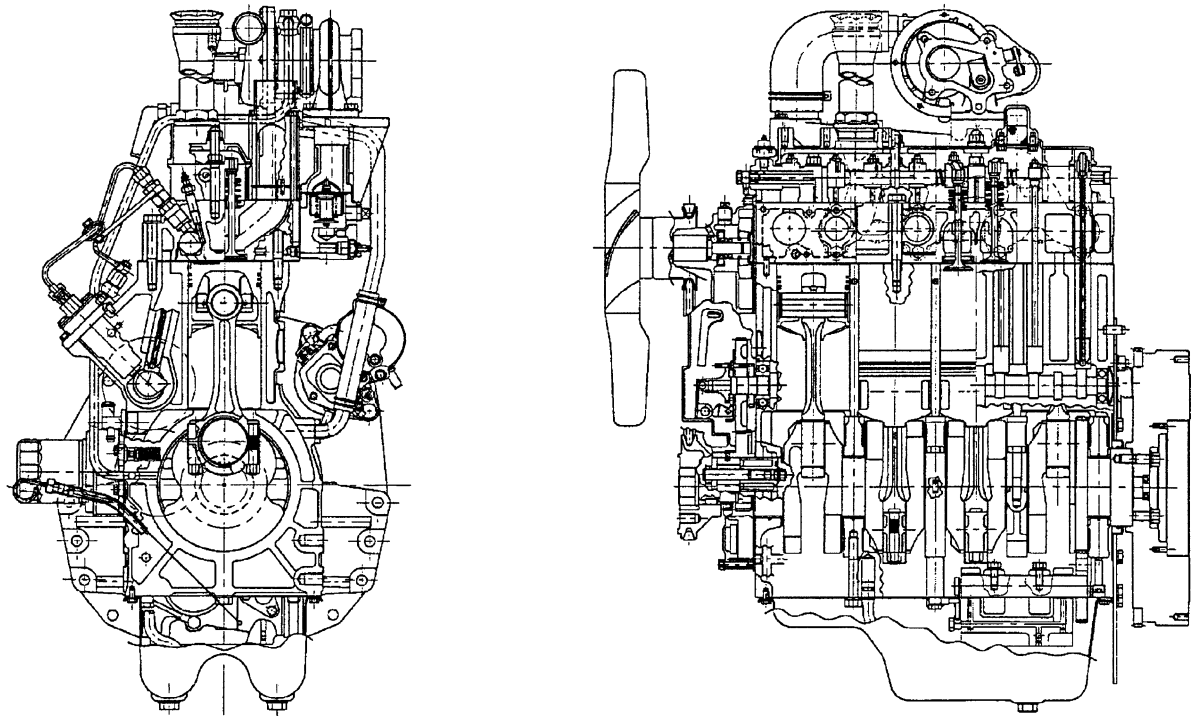
CYLINDER HEAD AND VALVE TRAIN COMPONENTS

The cylinder head incorporates the valve assemblies, rocker arms, rocker shaft, push rods, and lifters. A swirl chamber located between the injector assembly and the main combustion chamber of the cylinders provides improved starting and greater fuel efficiency. Initial combustion starts in the precombustion chamber and as the expansion occurs a strong swirl pattern is created in the main combustion chamber for more complete combustion of the air-fuel mixture. The air intake manifold is separate from the cast aluminum valve cover on all these engines. The exhaust manifold is bolted on the left-hand side of the cylinder head on each of the models. Cylinder heads have integral valve guides. Standard size valves only are used.

CYLINDER BLOCK ASSEMBLY

N844L-T

The cylinder block assembly contains the pistons, connecting rods, crankshaft, timing gears, and engine oil pump. The crankshaft is supported on five main bearings. The front bearing is positioned in a bore in front of the block. The other bearings are split liners located in holders bolted to the block. The camshaft is supported on four ball bearings located in the block.



20035585 MODEL N844L-T (DX55 and DX60)

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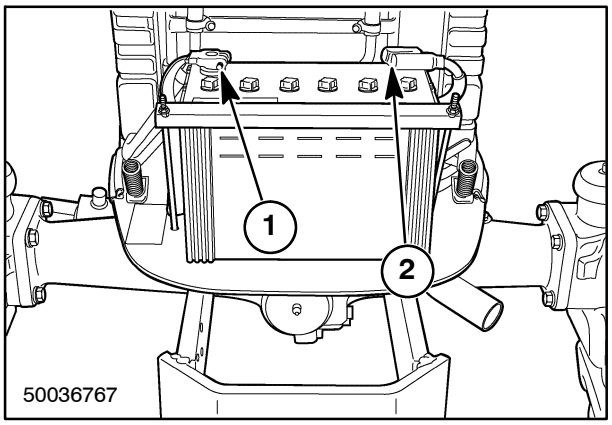
ENGINE

Removal

1. Disconnect the negative (–) battery cable, 1, and positive (+) battery cable, 2, from the battery.



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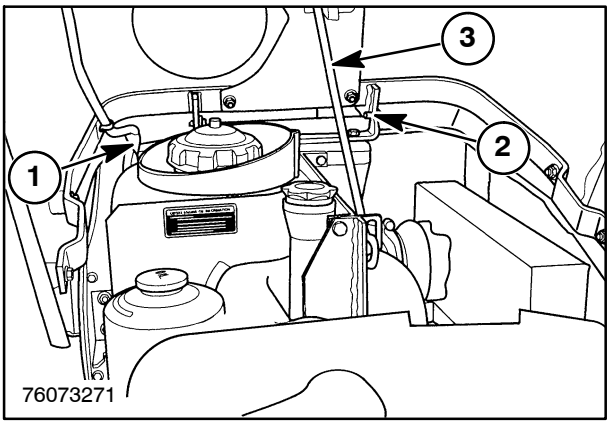
2. Disconnect the headlight wire harness plug, 1.
3. Remove the clips and pins, 2, from each side of the hood bracket.
4. Remove the support rod, 3, and remove the hood from the tractor.



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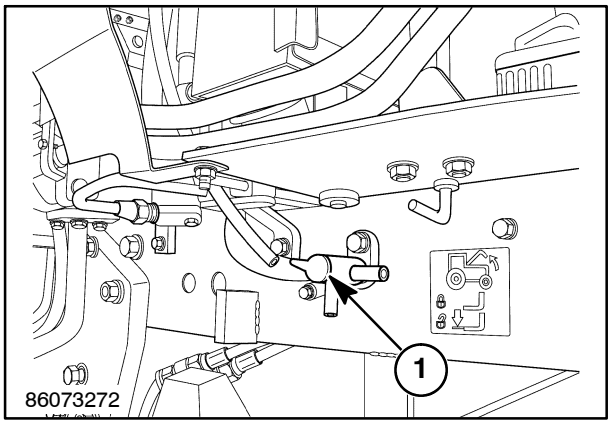
5. Drain the coolant from radiator, and engine using the petcock valve, 1. Remove radiator cap to assist draining.
6. Remove the radiator (see Radiator Removal in Section 10).



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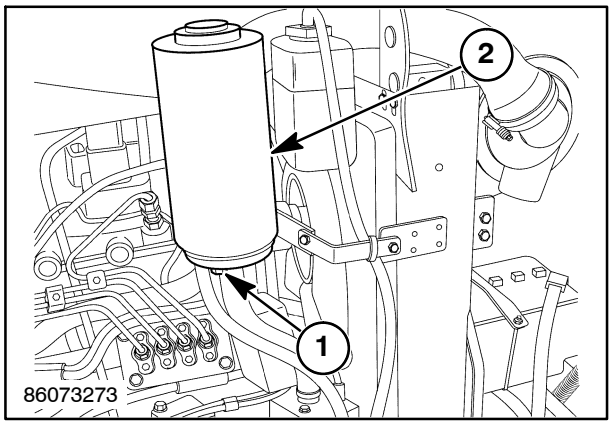
7. Loosen and remove the drain plug, 1, from the power steering reservoir, 2, and drain into a suitable container.

NOTE: *See "Separating the Tractor at the Transmission" in Section 21 to separate the tractor.*



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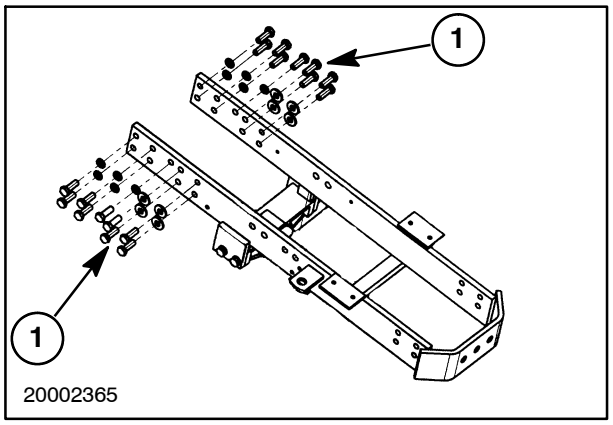
8. After the tractor has been successfully separated, support the front axle and the front support frame with jack stands.
9. Remove the firewall from the engine.
10. Remove the muffler and exhaust pipe from the tractor.
11. With the chain and hoist still attached to the engine, remove the mount bolts, 1, from each side of the frame rails.
12. Carefully remove the engine.



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Installation

1. Attach a hoist to the engine, and position it onto the frame.
2. Install the engine mounting bolts on both sides of the frame. Apply Loctite® thread locker 242 to the thread of the bolts. TIghten bolts to the following torques:

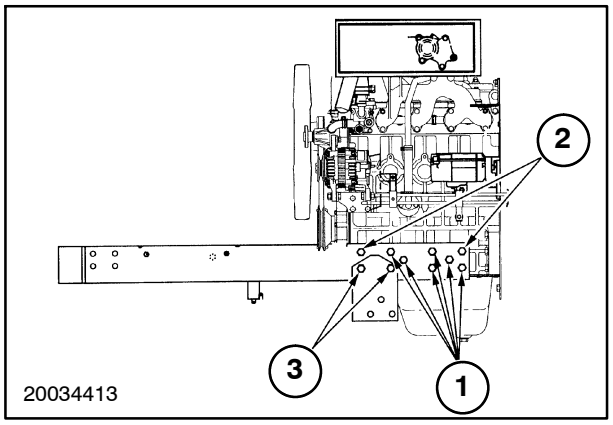
   torques #1 – 80 N·m (60 ft-lbs)

   torques #2 – 80 N·m (60 ft-lbs)

   torques #3 – 175 N·m (130 ft-lbs)

3. Install the muffler and exhaust pipe onto the tractor.
4. Install the firewall onto the engine.

NOTE: *See section 21 for attaching the engine to the transmission.*



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OVERHAUL

ENGINE

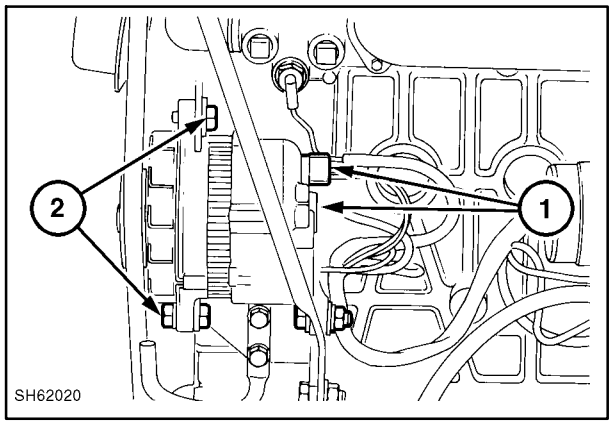
NOTE: *Some procedures discussed in this chapter are shown with the engine in the tractor. Many of the procedures can be done with the engine in or out of the tractor.*

ALTERNATOR

Removal

Disconnect the alternator wire harness and wires, 1.

Remove the alternator pivot and adjusting bracket, hardware, 2.



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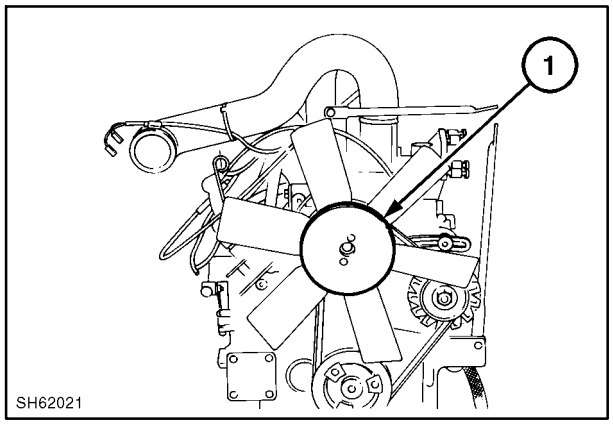
COOLING FAN AND PULLEY

Removal

Remove the fan, 1, retaining hardware and spacers.



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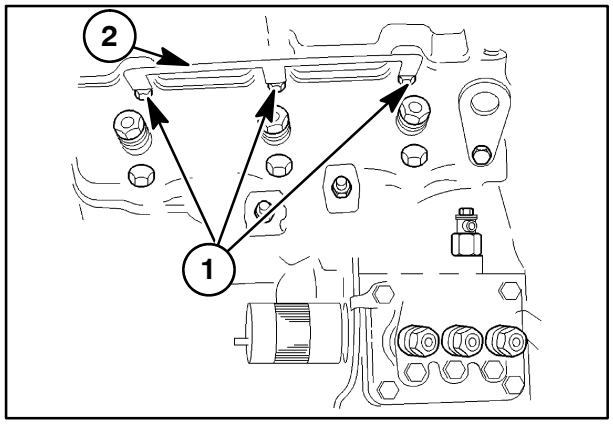
GLOW PLUG AND CONNECTOR

Removal

Remove the glow plugs, 1, and glow plug connectors, 2.



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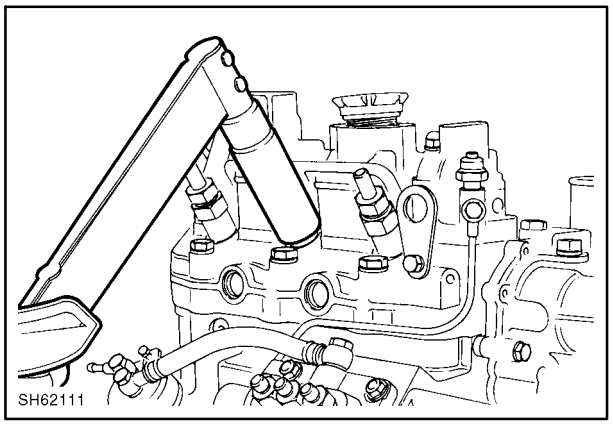
NOZZLE/HOLDER

Removal

Remove the nozzle and holder assembly with a socket for the nozzle holder.



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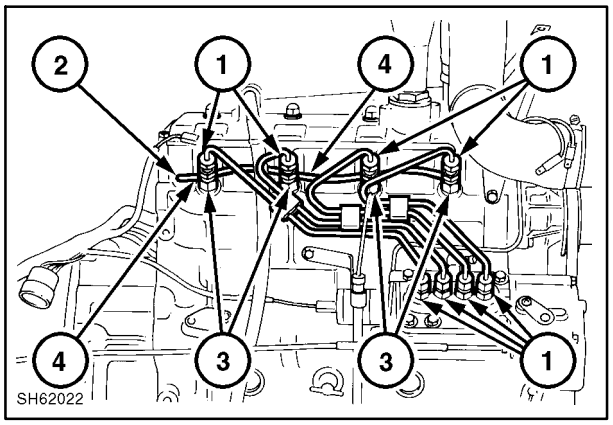
FUEL INJECTION PIPE

Removal

1. Loosen the fuel pipe nuts from the fuel injection pump and injectors, 1. Remove the pipes as an assembly.
2. Remove the spring clamp and fuel return hose, 2.



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INJECTOR

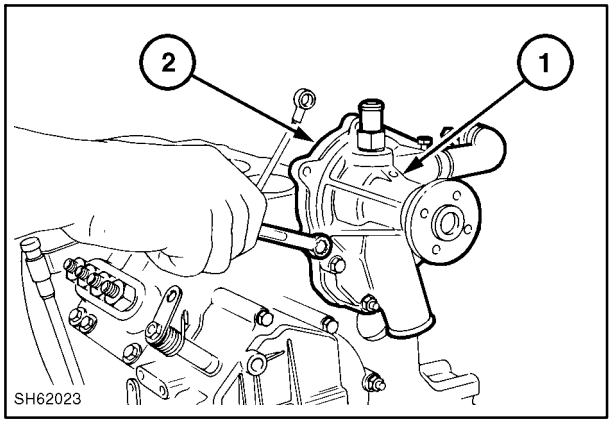
Removal

Loosen and remove the securing nuts, 3. Remove the leak-off rail, 4. Remove the aluminum washers and discard. Remove the injectors tagging or marking with the cylinder they were removed from.

WATER PUMP

Removal

Loosen the securing bolts and remove the water pump assembly, 1, and set plate, 2.



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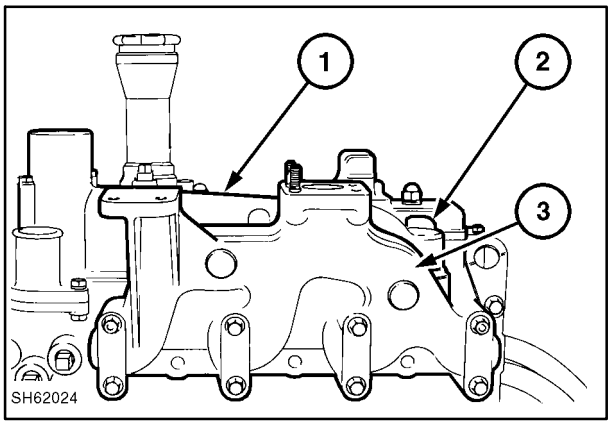
COVER/INTAKE MANIFOLD/EXHAUST MANIFOLD

Removal

Remove the intake manifold, 1, spacer, 2, and exhaust manifold, 3.

For the N844L-T turbocharged engine, refer to the turbocharger section of the manual for removal and replacement.



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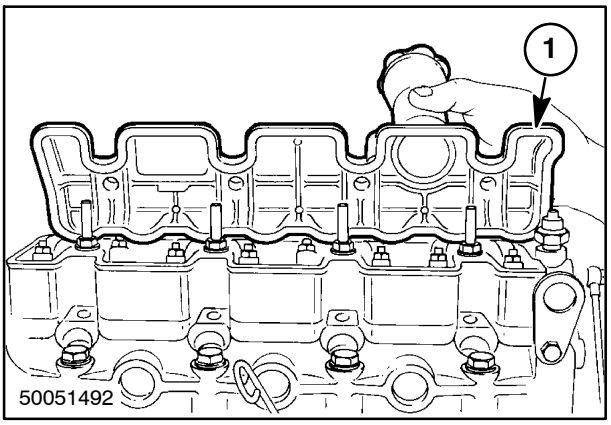
Loosen and remove four cap nuts with washers. Remove the head cover assembly, 1.



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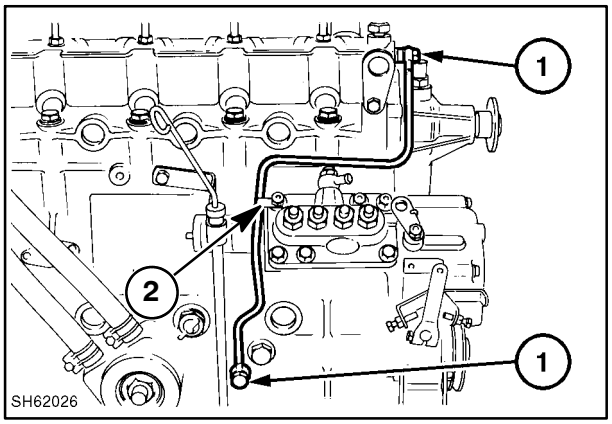
EXTERNAL OIL PIPE

Removal

1. Loosen and remove the two banjo bolts, 1, at the cylinder block main oil gallery and cylinder head assembly.
2. Remove the clamp, 2, from the fuel injection pump.



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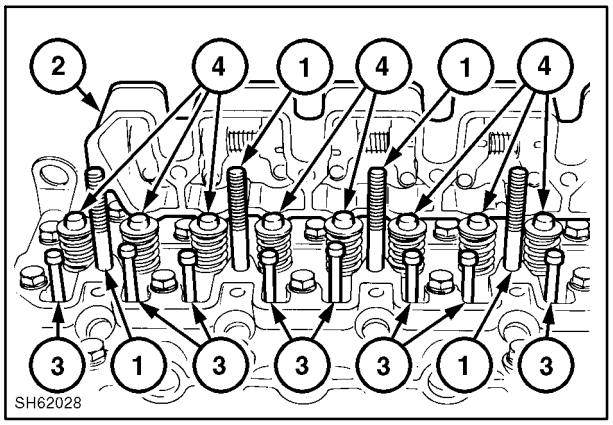
ROCKER ASSEMBLY

Removal

1. Loosen and remove nuts, lock washers, and flat washers from the rocker pillar stud, 1. Lift the rocker assembly, 2.
2. Remove the push rods, 3, and valve stem caps, 4.



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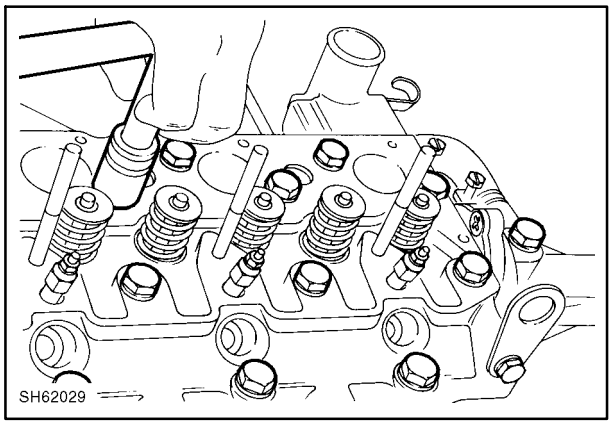
CYLINDER HEAD

Removal

Loosen the cylinder head bolts, starting from the center, in a circular pattern, using several steps of equal torque. Remove the head.



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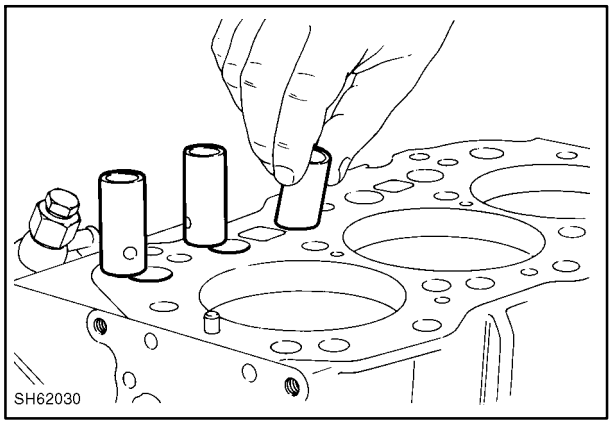
TAPPETS

Removal

Pull the tappets from the machined bore in the cylinder block.



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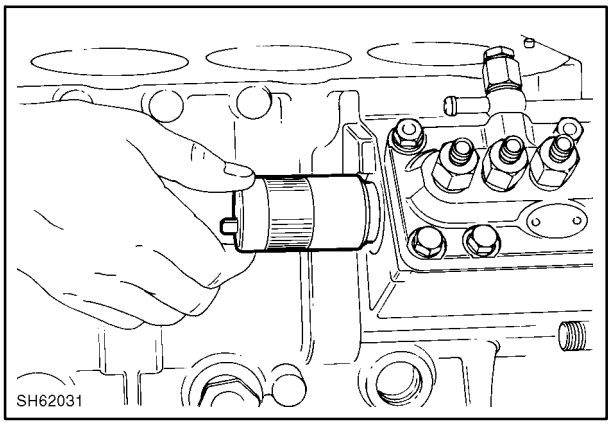
FUEL STOP SOLENOID

Removal

Unscrew the stop solenoid, and remove from the engine block.



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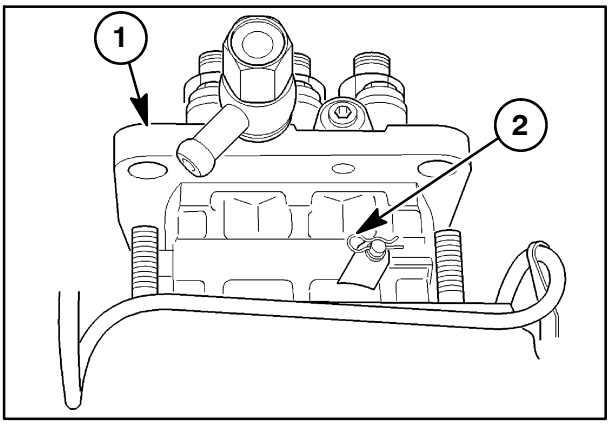
TIMING GEAR COVER

Removal

1. Drain the engine crankcase oil.
2. Remove the injection pump mounting nuts and raise the injection pump, 1, enough to remove the spring pin, 2, and separate the governor link from the control rack. Remove the injection pump.



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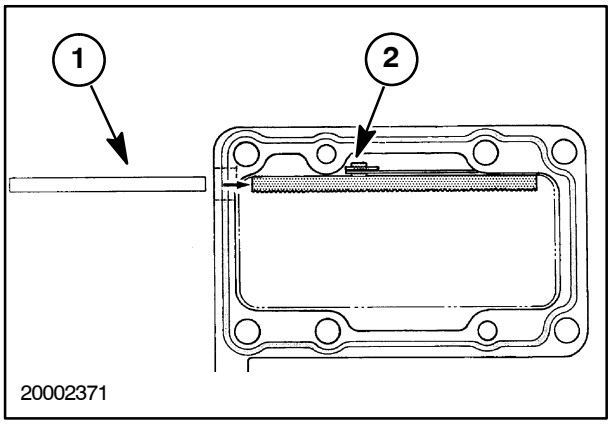
NOTE: *Insert a small dowel, 1, through the fuel shut-off solenoid hole and slide the control rack, 2, in to allow enough clearance to the cylinder block, for the pump to be removed.*



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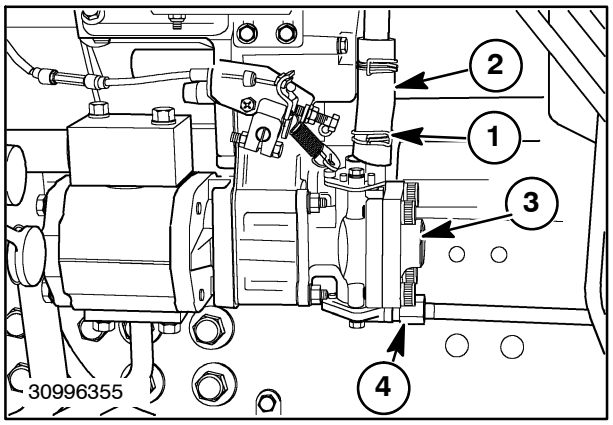
3. Loosen the hose clamp, 1, on the suction hose, 2, and remove the suction hose from the steering pump, 3.
4. Remove the pressure tube, 4, from the bottom of the steering pump.



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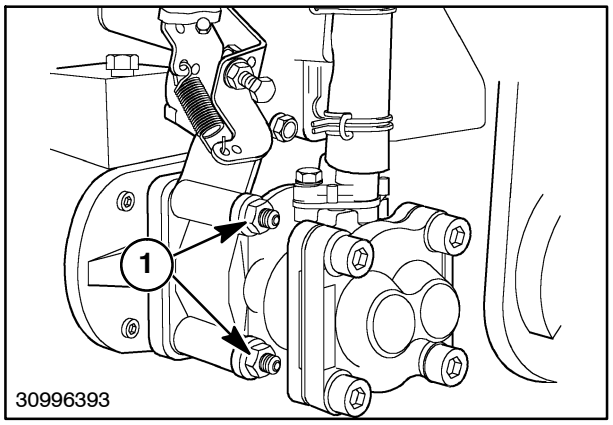
5. Remove the through bolts and nuts, 1, and remove the steering pump from the front cover. Cap the lines and pump openings.

NOTE: *Two of the power steering pump retaining bolts are not shown.*



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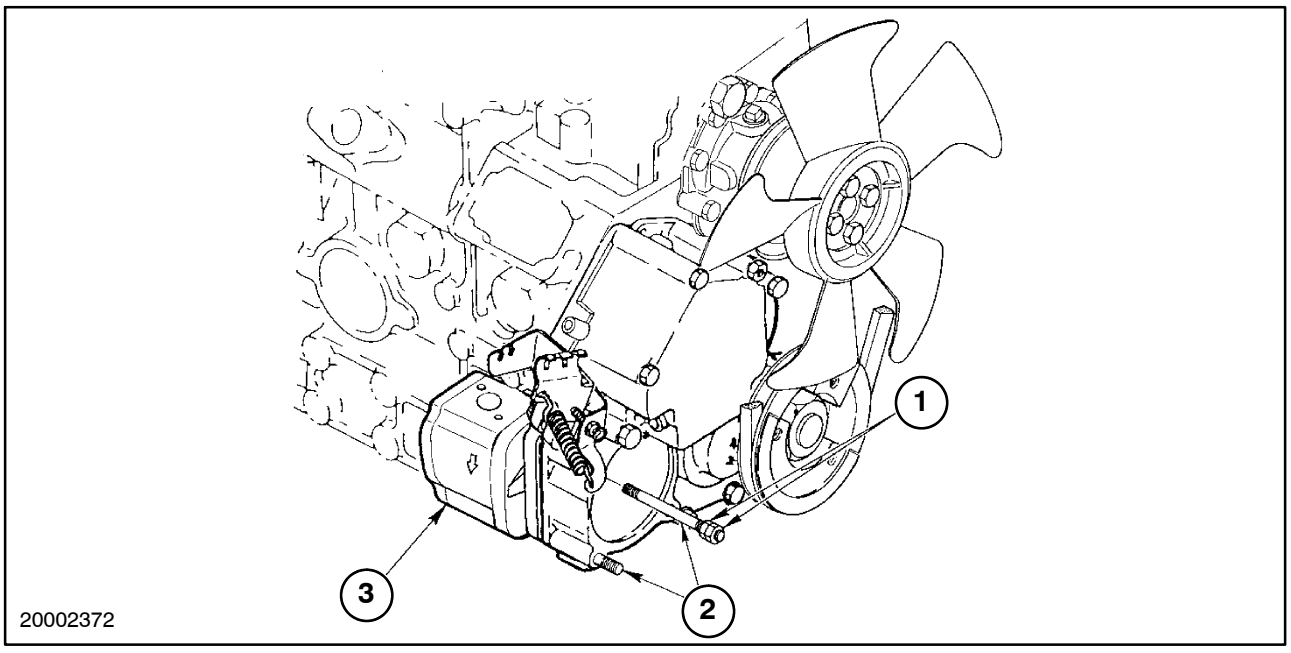
6. Install and tighten two nuts, 1, against each other, onto the retaining studs, 2. Remove the studs, 2, and the hydraulic pump, 3.



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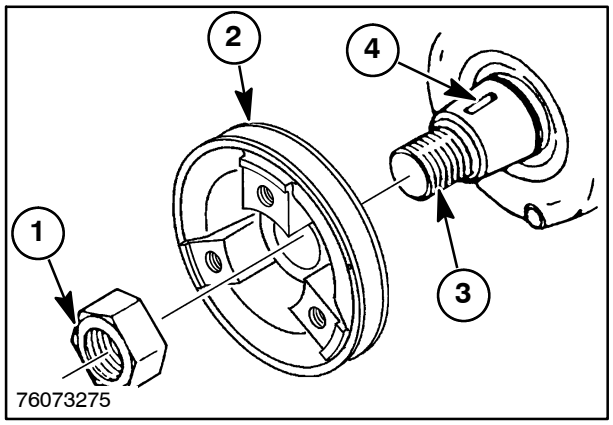
7. Remove the retaining nut, 1. Pull crankshaft pulley, 2, off of crankshaft, 3. Remove key, 4, from crankshaft.



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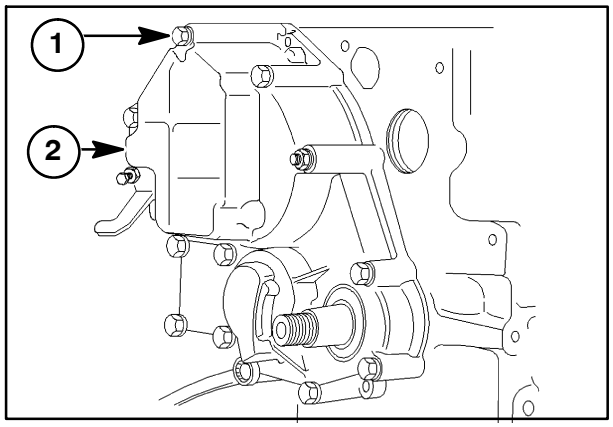
8. Remove the retaining bolts, 1, and lift the cover, 2, off the locating dowels.



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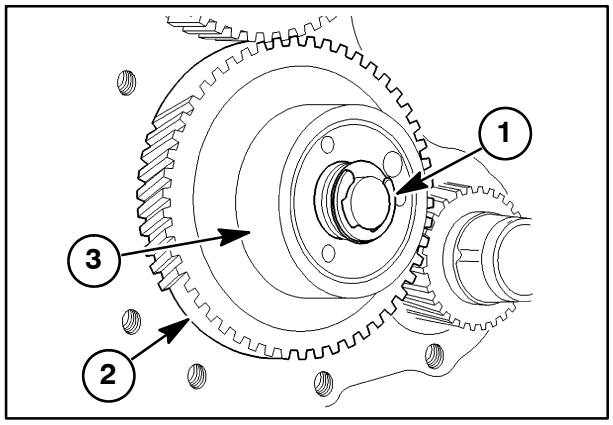
TIMING GEARS AND CAMSHAFT

Removal

1. Remove retaining ring, 1, and remove the idler gear, 2, and oil pump assembly, 3.



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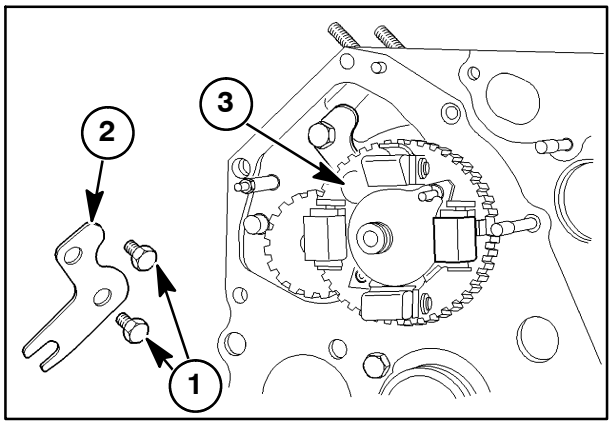
2. Remove the two bolts, 1, securing the keeper plate, 2. One must be accessed using the access hole, 3, in the cam gear.
3. Slide the camshaft and gear out of the camshaft bore.



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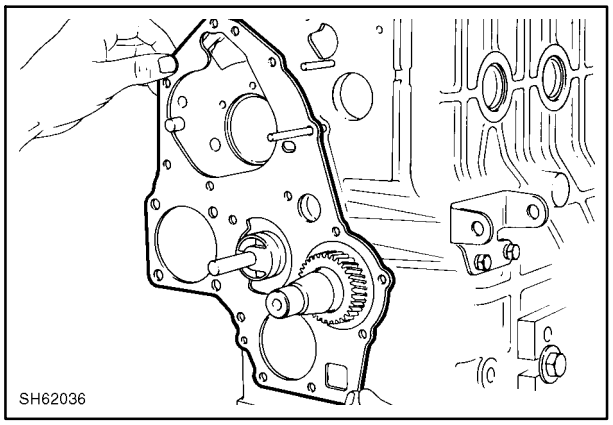
FRONT END PLATE

Removal

Remove the retaining bolts and lift the front plate off its locating dowels. Remove the gasket and discard.



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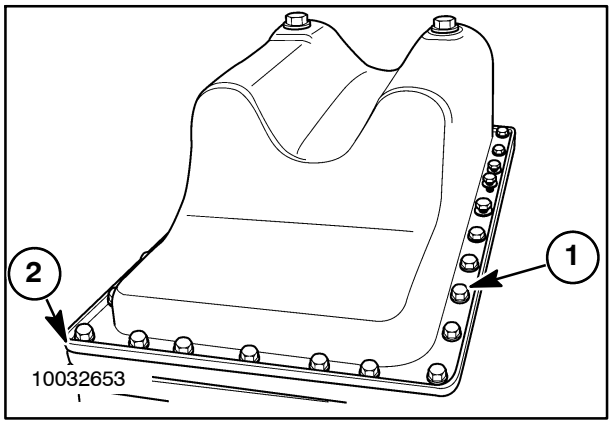
OIL SUMP

Removal

1. Remove the oil sump retainer bolts, 1.
2. Remove the oil sump and discard gasket.
3. Remove steel spacer, 2, from the block.



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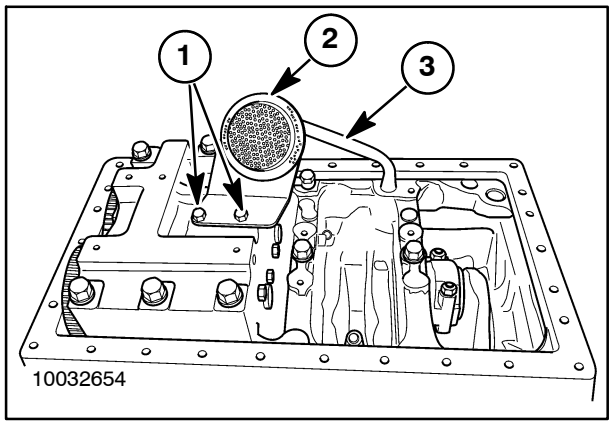
OIL SUCTION PIPE AND STRAINER

Removal

1. Remove the two retaining bolts, 1.
2. Remove the oil strainer, 2, and rotate the oil suction pipe, 3, out of its bore.



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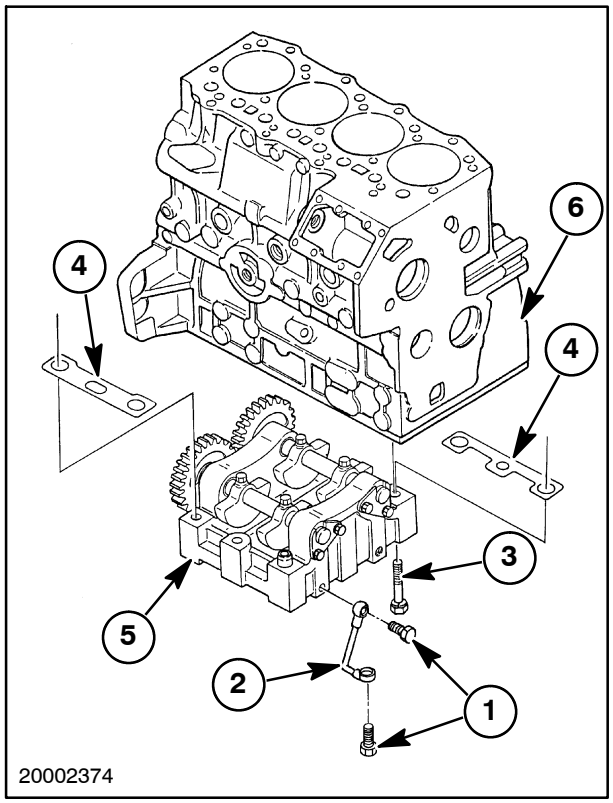
BALANCER ASSEMBLY

Removal

1. Remove the banjo bolts, 1, and the oil transfer pipe, 2.
2. Loosen and remove the balancer retaining bolts, 3.

NOTE: *Observe the quantity and thickness of the shims, 4, (if used) for re-installation upon assembly.*

3. Remove the balancer assembly, 5, from the engine block, 6.



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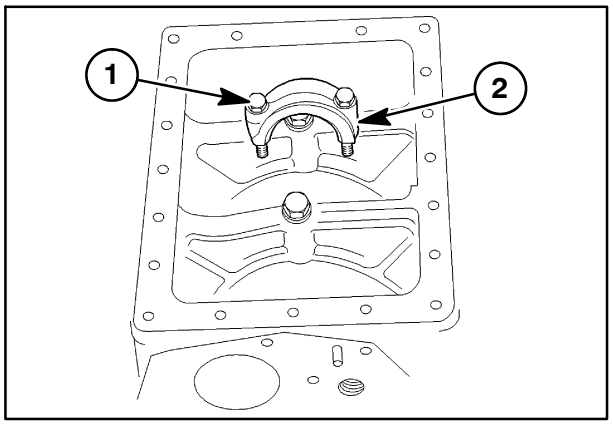
CONNECTING RODS, BEARINGS AND PISTONS, RINGS

Removal

1. Remove the two bolts, 1, retaining the connecting rod caps, 2.
2. Remove the connecting rod caps and lower half of connecting rod bearing.
3. If necessary, remove any ridge from the top of the cylinder bores using a suitable ridge reamer.



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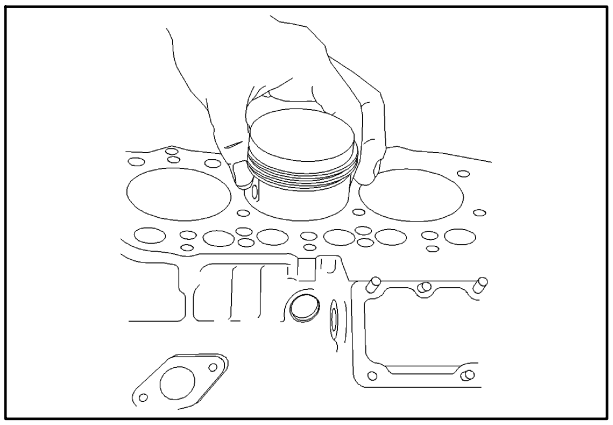
4. Push the piston and connecting rod out of the cylinder block.
5. Replace the connecting rod cap to the piston assembly it was removed from. Keep together in cylinder sequence.



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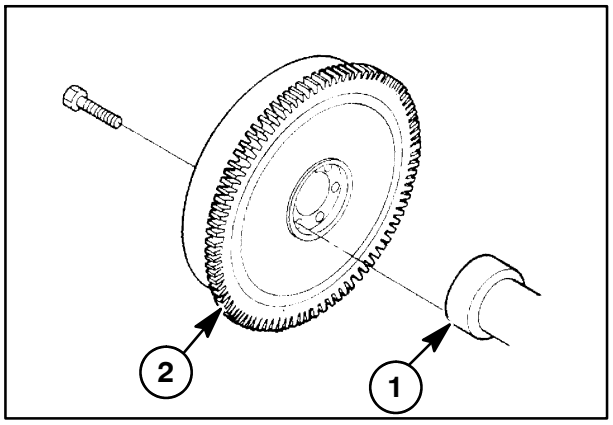
FLYWHEEL

Removal

1. Loosen the flywheel retaining bolts.
2. Using a brass drift and hammer, tap the end of the crankshaft, 1, to loosen the flywheel, 2, from the shaft.



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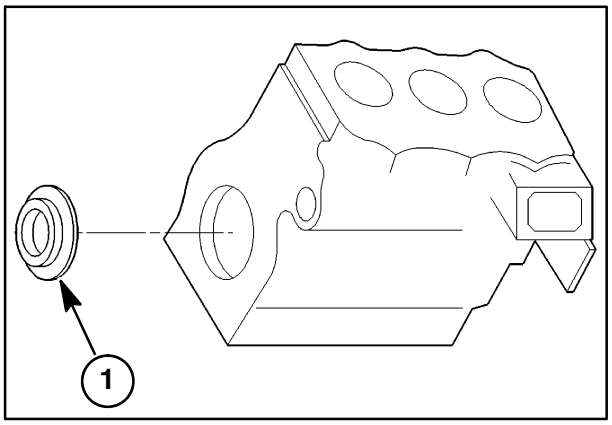
BACKPLATE AND OIL SEAL

Removal

1. Remove the backplate retaining bolts and remove the backplate.
2. Remove the rear oil seal, 1.



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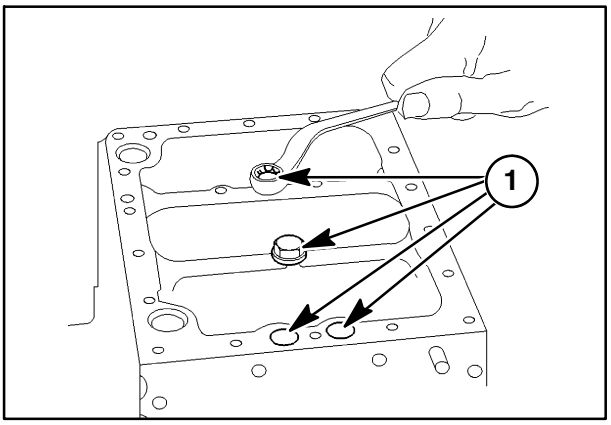
CRANKSHAFT AND MAIN BEARINGS

Removal

1. Remove the crankshaft bearing holder retaining bolts, 1.



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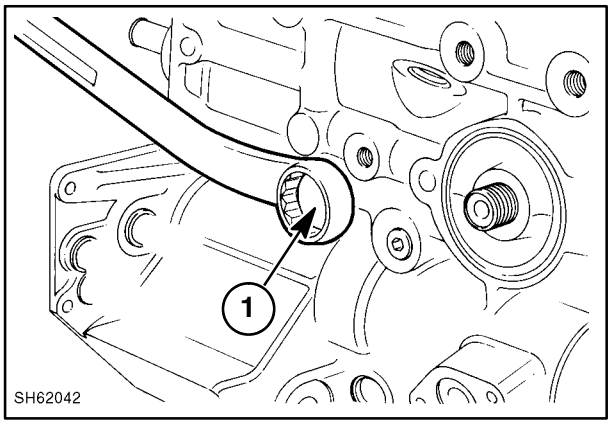
2. Remove the relief valve assembly, 1.
3. Slide the crankshaft and main bearing assembly through the rear of the engine.



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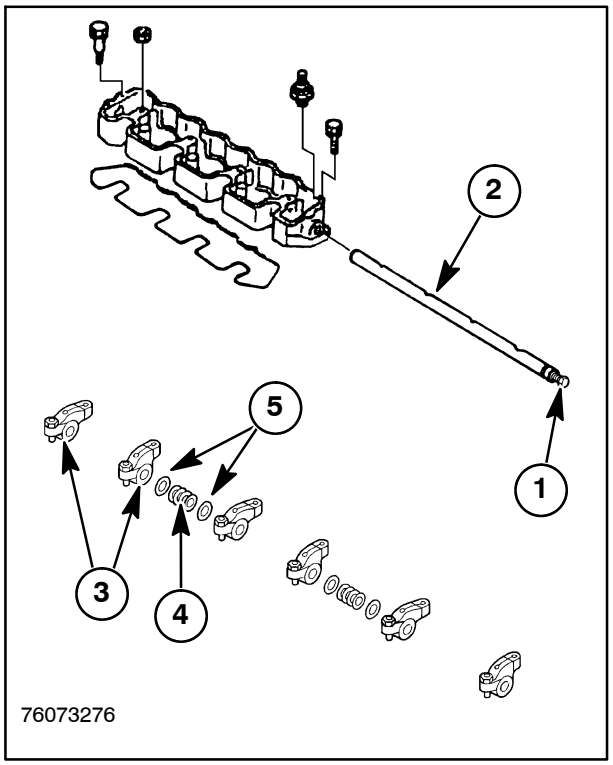
ROCKER ARM ASSEMBLY

Disassembly

1. Thread a 8 mm bolt, 1, into the rear end of the rocker shaft and slowly withdraw the rocker shaft, 2, while at the same time removing the rocker arms, 3, springs, 4, and shims, 5.

NOTE: *The rocker shaft housing must be removed from the cylinder head, before rocker shaft can be removed from housing. Housing mounting bolts retain rocker shaft.*



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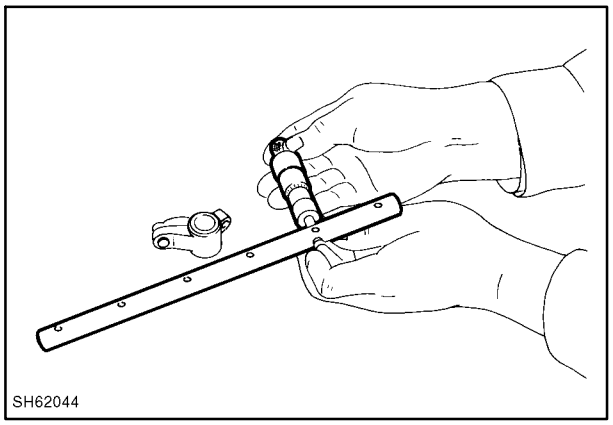
Inspection and Repair

1. Wear of Rocker Arm Shaft

   Using a micrometer, check the outside diameter of the rocker arm shaft. If the rocker arm shaft is worn beyond the allowable limit, replace.

Standard dimension	Allowable Limit
14.95 mm – 14.97 mm (0.588″ – 0.589″)	14.87 mm (0.585″)



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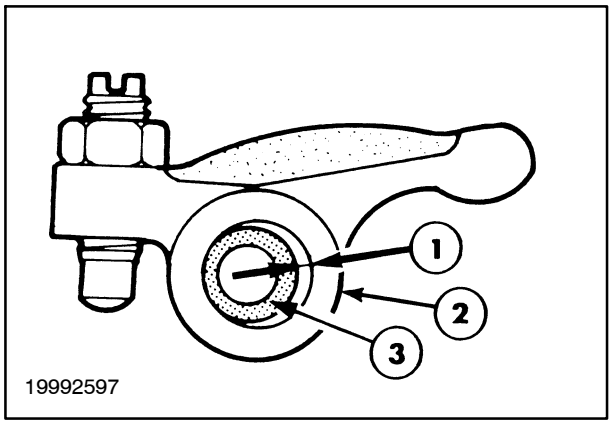
2. Rocker Arm-to-Shaft Clearance

   Measure the inside diameter of the rocker arm. Calculate the clearance at, 1, between the rocker arm, 2, and the rocker arm shaft, 3. If the clearance is excessive, replace.

Standard Clearance	Allowable Limit
0.030 mm – 0.093 mm (0.0012″ – .0037″)	0.2 mm (0.008″)

3. Wear on valve stem contacts face of the rocker arm.

   Check the face for step wear or score. Slight wear may be corrected using an oil stone.



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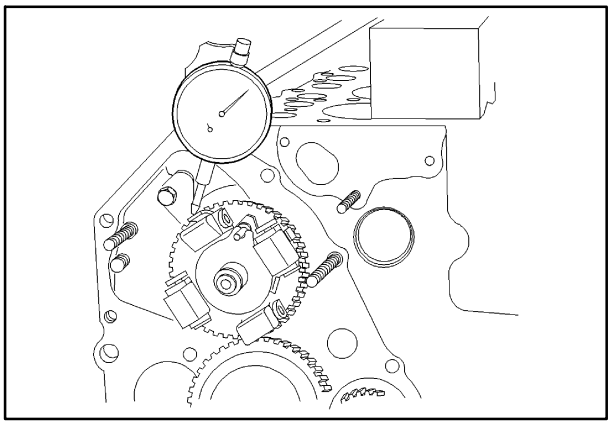
TIMING GEAR

Inspection

1. Check the timing gears for wear and damage on the contact area. Replace if any defect is found.
2. Measure the backlash of gears with a feeler gauge or dial indicator. If the allowable limit is exceeded, replace all timing gears.

Standard	Allowable Limit
0.08 mm (0.003″)	0.25 mm (0.010″)



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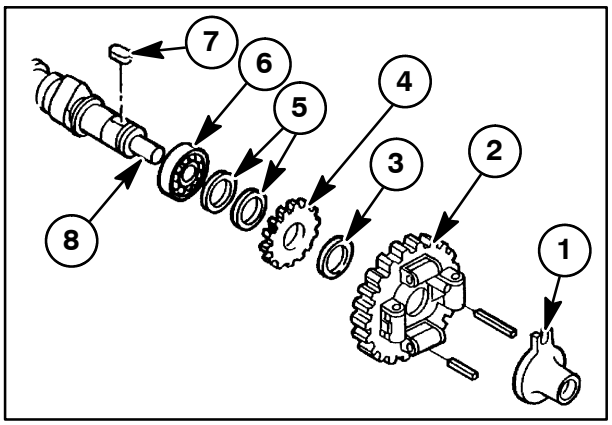
CAMSHAFT

Disassembly

1. Remove the slider, 1, from the camshaft gear.
2. Using a gear puller, remove the gear assembly, 2, spacer, 3, tachometer gear, 4, spacers, 5, bearing, 6, and key, 7, from the camshaft, 8.



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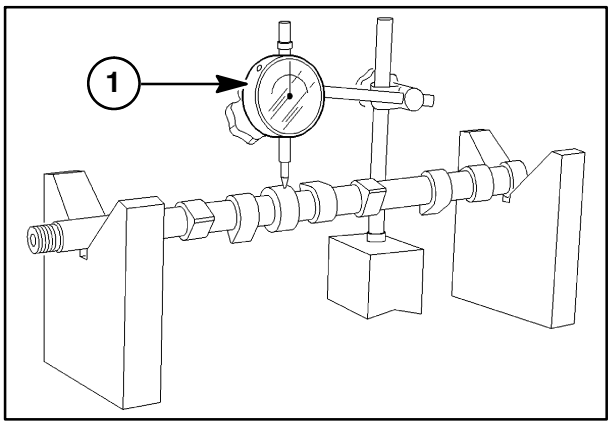
Inspection

1. Place the camshaft in a set of V-blocks and check the runout using a dial indicator, 1.
2. Replace or straighten the camshaft if the runout is greater than 0.1 mm (0.004″).
3. Using a micrometer, measure the height of the camshaft lobes.
4. Replace the camshaft if any of the cam lobes are worn to less than the following dimensions:

   Valve Lobe: 34.1 mm (1.3425″)

   Injection Pump Lobe: 42.8 mm (1.685″)



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OIL PUMP

Disassembly

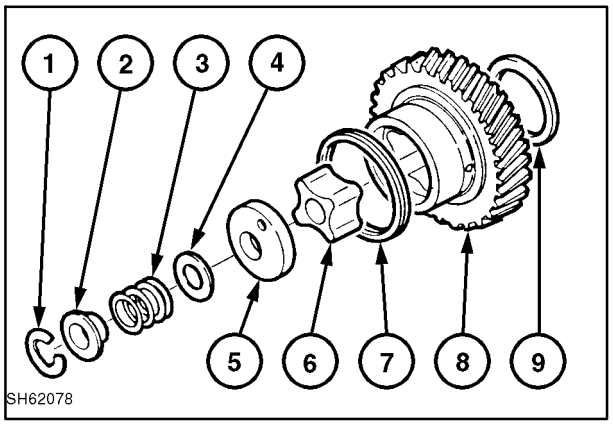
Remove the snap ring, 1.

Take out the collar, 2, spring, 3, and shim, 4.

Remove the oil pump cover, 5.

Remove the rotor, 6, and spring, 7, from idler gear, 8.

Remove the thrust washer, 9, from the idler gear.



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1. Snap ring
2. Collar
3. Spring
4. Shim
5. Oil pump cover
6. Rotor
7. Spring
8. Idler gear
9. Thrust washer

Inspection

Check the oil pump cover, rotor, and vane for wear. If excessively worn or damaged, replace.

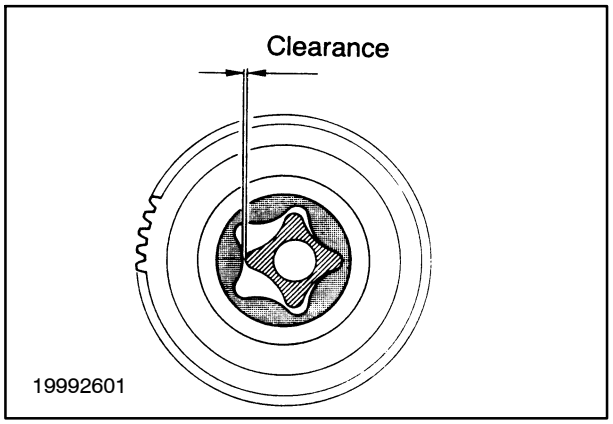
Check the clearance between the rotor and the vane.

Assembly (see Idler Gear)

Reassemble the oil pump in the reverse order of disassembly.

Align the set marks on the crankshaft gear and idler gear to reassemble.

Make sure the tip clearance between the rotor and the vane is 0.01 mm to 0.15 mm (0.0004″ to 0.006″). Allowable limit is 0.25 mm (0.010″) .



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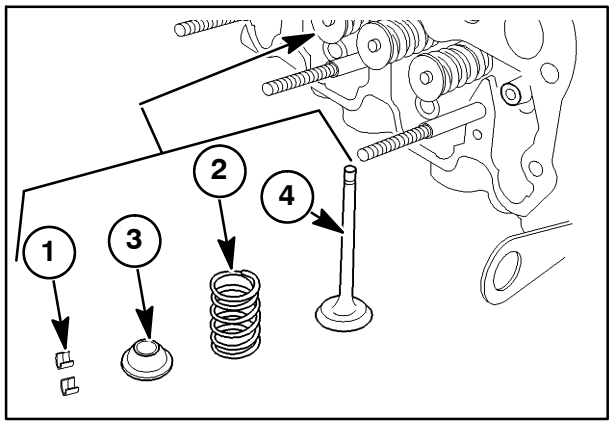
CYLINDER HEAD

Disassembly

1. Clean the cylinder head and remove any carbon deposits from around the valve heads.
2. Use a valve spring compressor and remove the valve spring retainer locks, 1, spring, 2, and spring retainer, 3, from each valve, 4.
3. Remove the valves and place the valve components together in separately marked containers for reassembly in their original position.



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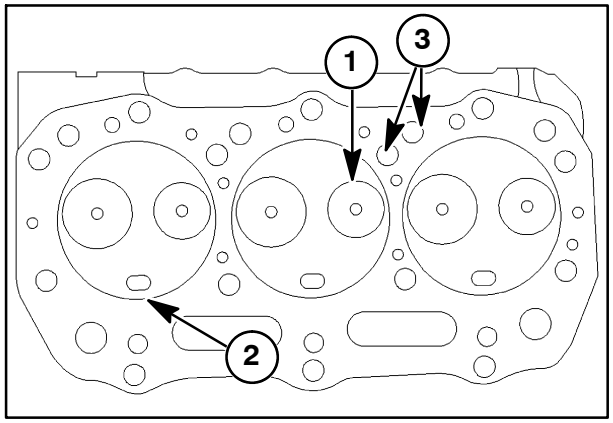
Inspection and Repair

1. Clean all carbon deposits from the combustion chamber and valve ports using a wire brush and scraper.
2. Clean all dirt and residue from the gasket surface using care not to scratch or nick the machined surface.
3. Clean the cylinder head in solvent and air dry.
4. Inspect the head for cracks or damage in the following areas:
   - Valve ports
   - Valve seats, 1
   - Prechamber, 2
   - External cracks in the water jackets, 3
5. Inspect the gasket surfaces for scratches or nicks, which could cause leakage.
6. Examine the core hole plugs for rust or signs of leakage. If a plug shows signs of damaging rust or leakage, replace all plugs in the head.
7. Inspect the prechamber for carbon deposits and looseness. Remove any carbon deposits found. If prechamber is found to be loose, cylinder head may be warped.
8. Check six positions (1 to 6 lines, as shown) for warping. If found to be warped excessively, correct with a surface grinder.

Standard Value	Allowable Limit
0.05 mm or less (0.002″)	0.12 mm (0.005″)



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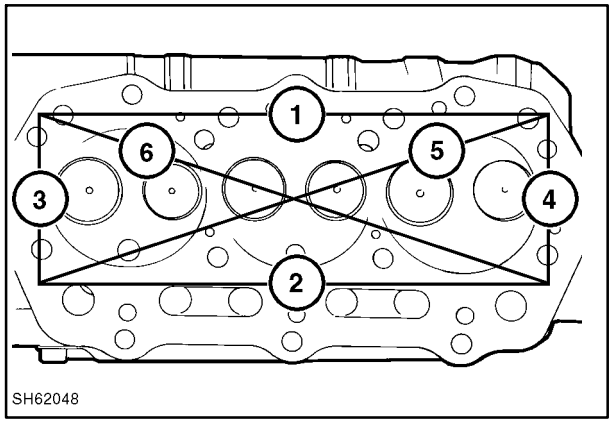

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