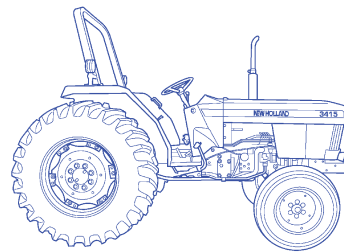


NEW HOLLAND 3415



REPAIR MANUAL



NEW HOLLAND

SERVICE

3415 REPAIR MANUAL CONTENTS

SECTION 1 - ENGINE SYSTEMS

SECTION 2 - FUEL SYSTEMS

SECTION 3 - ELECTRICAL SYSTEM

SECTION 4 - CLUTCH

SECTION 5 - TRANSMISSION SYSTEMS

SECTION 6 - POWER TAKE-OFF SYSTEMS

SECTION 7 - DIFFERENTIAL, REAR AXLE AND BRAKES

SECTION 8 - HYDRAULIC SYSTEM

SECTION 9 - STEERING SYSTEM

SECTION 10 - FRONT AXLE AND RELATED PARTS

SECTION 11 - WHEELS AND TIRES

SECTION 12 - SEPARATING THE TRACTOR

SECTION 1 - ENGINE SYSTEMS

Chapter 1 - Engine and Lubrication System

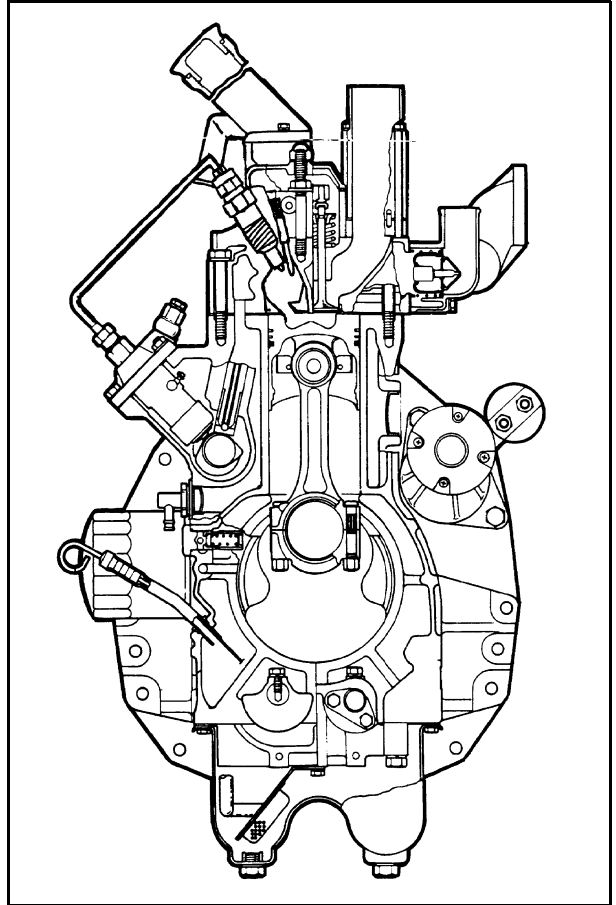
CONTENTS

Section	Description	Page
00 000	Engine and Lubrication System Description and Operation	1-2
00 000	Engine Overhaul	1-7
00 000	Engine Lubrication System Description	1-18
00 000	Engine Lubrication System Overhaul	1-21

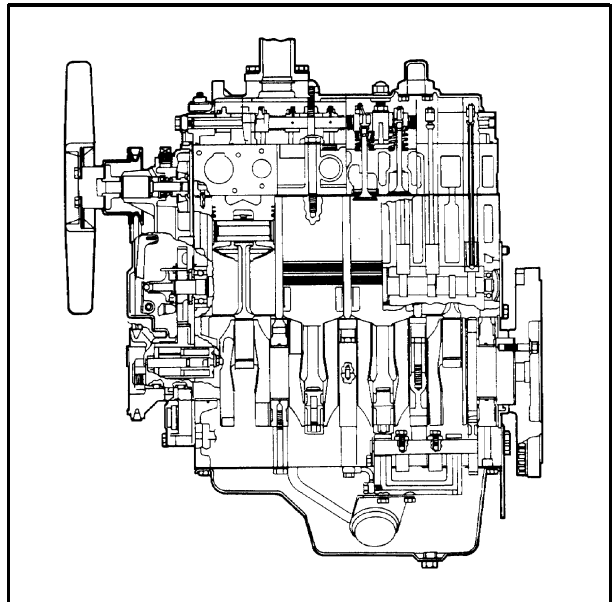
ENGINE SYSTEM DESCRIPTION AND OPERATION

This chapter describes engine overhaul and repairs procedures for the Model 3415 tractor engine.

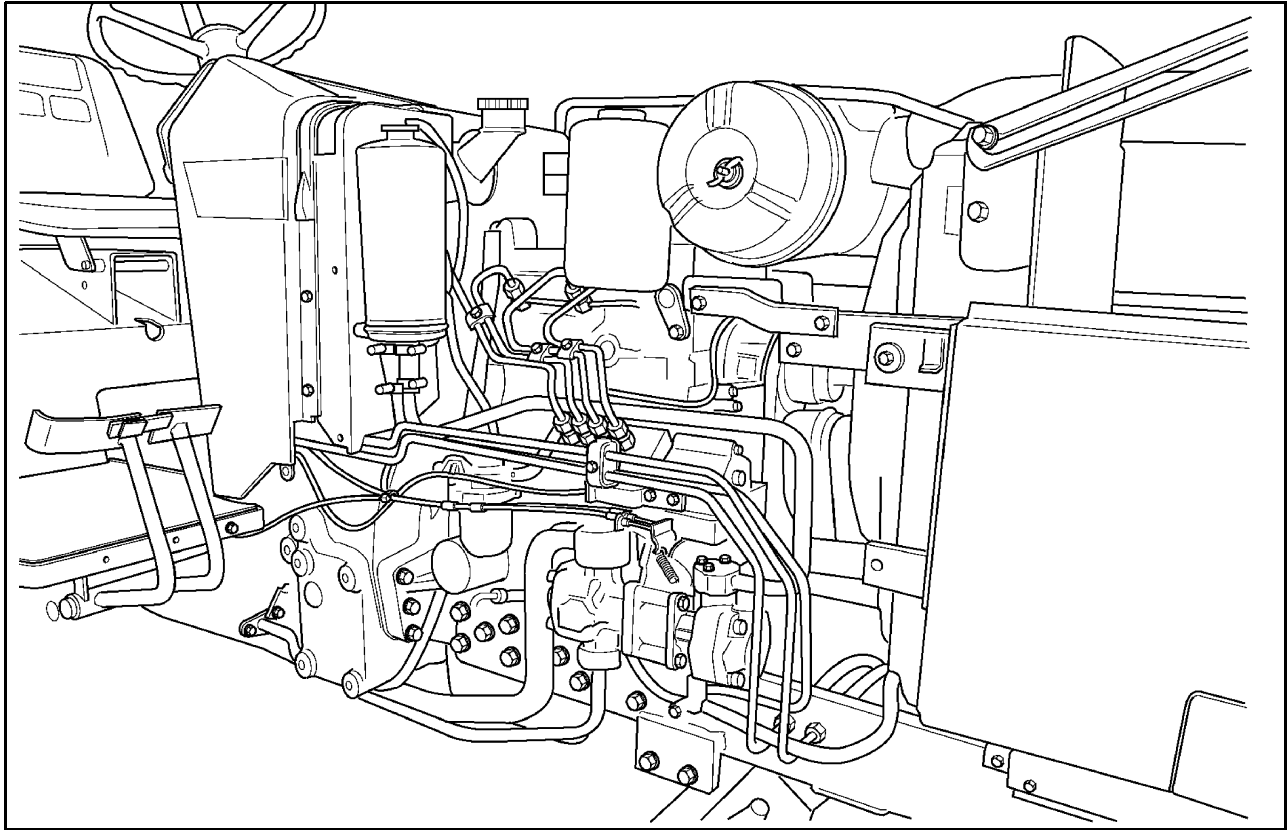
The engine is a four cylinder, four cycle, overhead valve, liquid cooled engine, Figures 1 and 2.



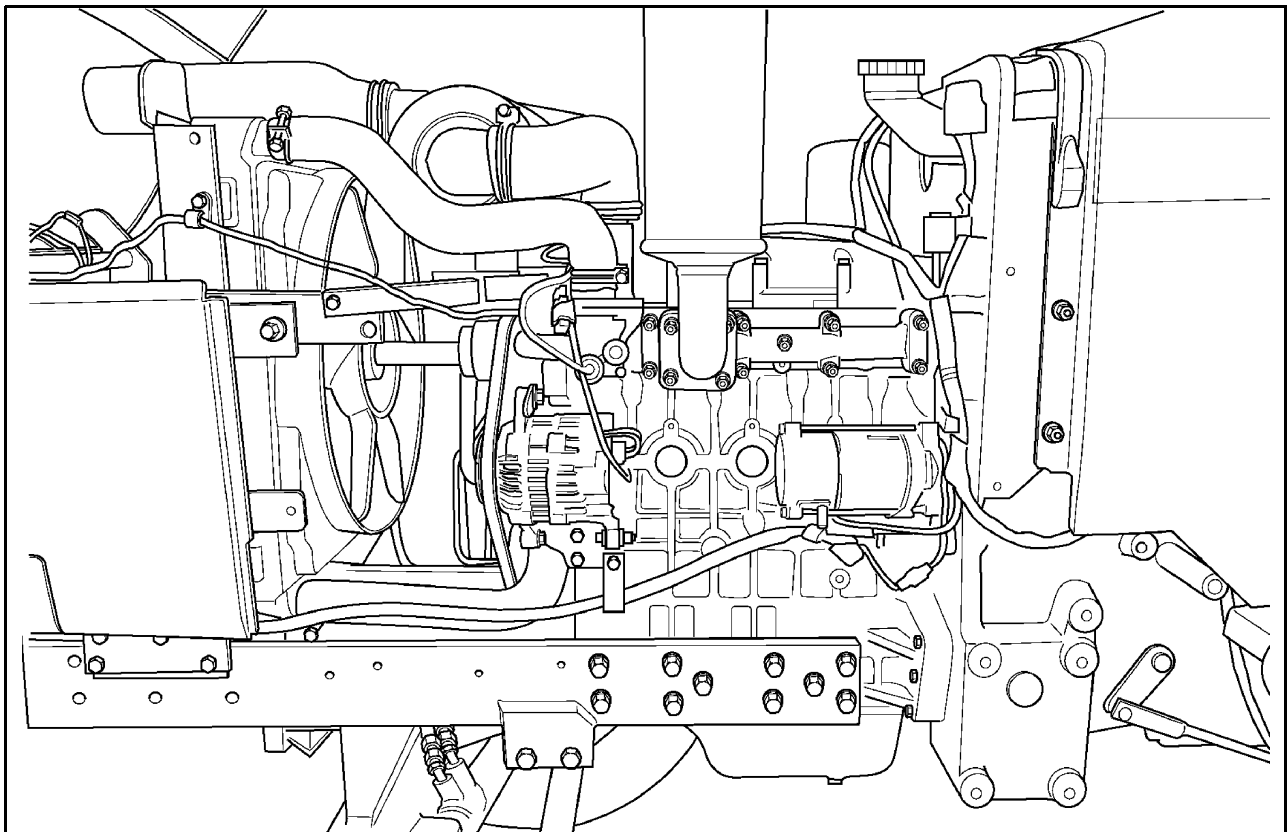
1



2



3

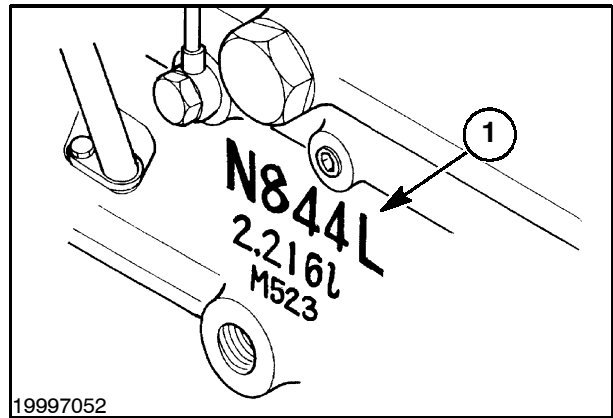


4

SECTION 1 - ENGINE SYSTEMS - CHAPTER 1

The engine is identified by a code number, 1, cast into the side of the cylinder block.

Engine Identification	Tractor Model	Horsepower
N844L	3415	47.0



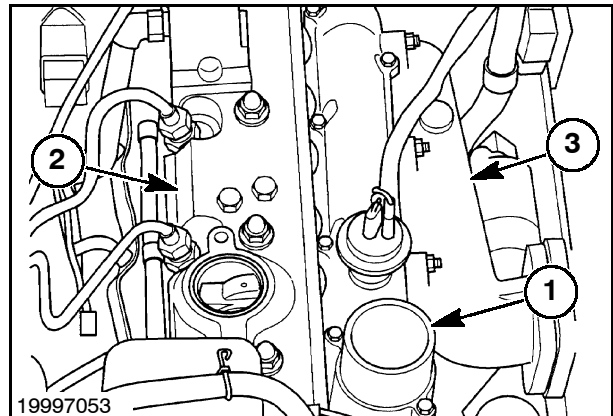
5

Cylinder Head and Valve Train Components

The cylinder head incorporates the valve assemblies, rocker arms, rocker shaft, push rods, and lifters.

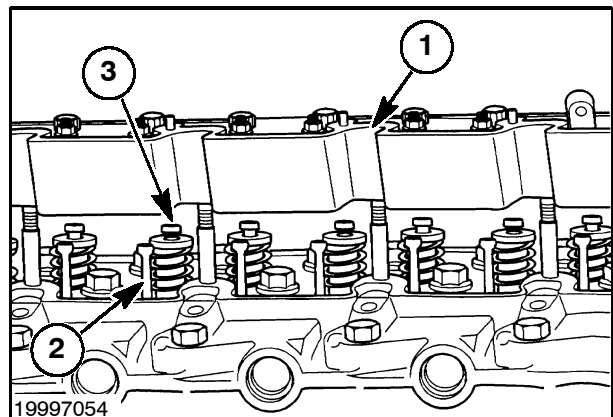
The intake manifold, 1, is located on the top of the cylinder head and is separate from the valve cover, 2.

The exhaust manifold, 3, is bolted to the left side of the cylinder head.



6

The valve rocker arms and support shaft, 1, are mounted in a separate support casting bolted to the top of the cylinder head.



7

Cylinder Block Assembly

NOTE: This engine is certified to 1999 EPA emission legislation. No one is permitted to repair the engine unless the fuel delivery is unchanged, therefore preserving the emissions performance, eg. replacement of block, short block assembly, smoke set, etc. is not permitted. In that case please use a long block assembly for repairing.

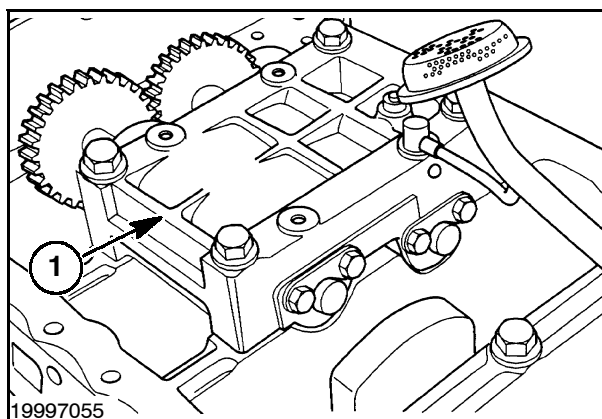
The cylinder block assembly contains the pistons, connecting rods, crankshaft, camshaft, timing gears, engine oil pump and dynamic balancer assembly.

The engine is equipped with straight connecting rods.

The crankshaft is supported on five main bearings. The front bearing is supported in a bore in the front casting of the cylinder block.

All remaining bearings are split liners retained in cast iron holders.

The engine incorporates a dynamic balancer assembly, 1, that is bolted to the under side of the block and driven by the crankshaft.



Lubrication System

The oil pump assembly is located within the idle gear at the front of the block and below and to the left of the crankshaft as viewed from the front. The oil pump is driven by the crankshaft gear.

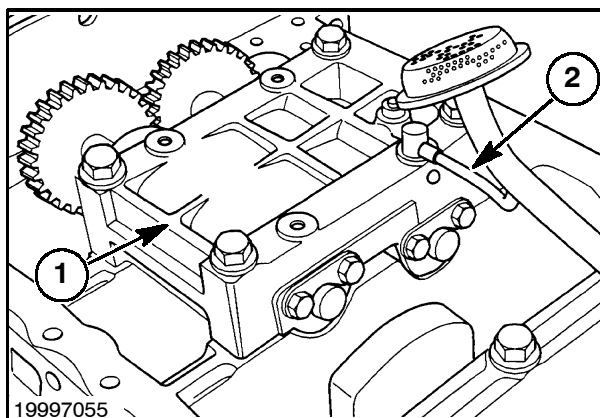
Oil is picked up from the sump by the intake tube and drawn into the lower side drilling in the block to the oil pump. Oil from the pump flows through passages in the block, past the relief valve, through the oil filter and returns to the main oil gallery in the area of the drilled bolt located on the side of the block. Oil flow in the main oil gallery extends to the main bearings. Oil flow to the main bearings passes through drilled passages in the crankshaft to the connecting rod bearings.

Oil from the main oil gallery supplies pressure oil to the dynamic balancer, 1, through a tube, 2, connected to the under side of the block.

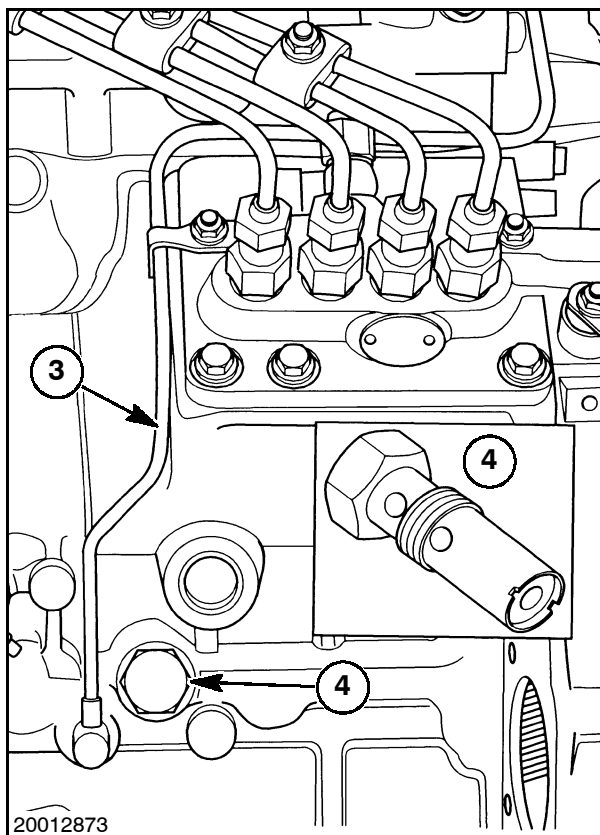
Pressure oil from the main oil gallery flows through a tube, 3, to the front of the valve rocker shaft to lubricate the rocker arms, valve stems, push rods and tappets.

The relief valve, 4, is mounted in the side of the block and intersects the main oil passage. When the oil pressure exceeds the rated pressure, oil is bypassed through the relief valve directly to sump.

The cylinder walls, pistons and piston pins are splash lubricated by the crankshaft.



9

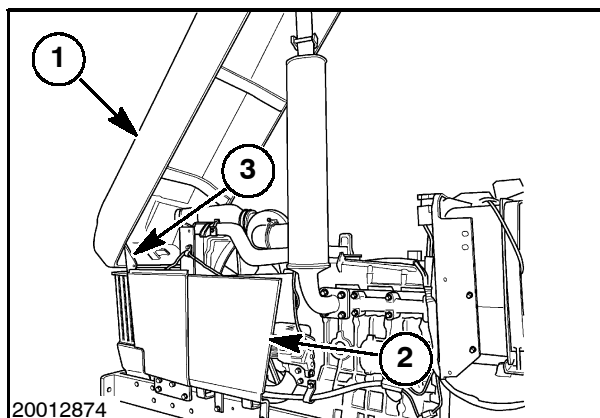


10

ENGINE OVERHAUL

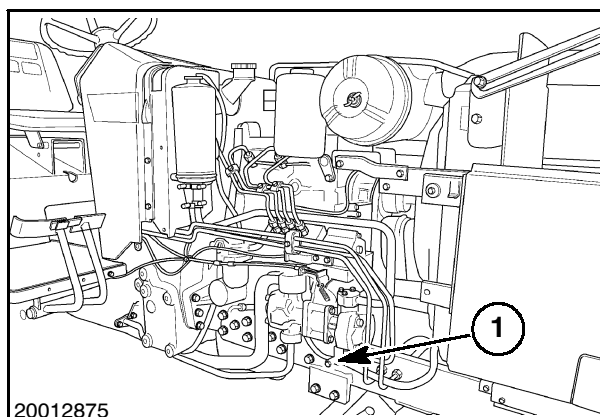
Cylinder Head Removal

1. Open the hood, 1, and remove the side covers, 2. Disconnect the headlight wiring, 3. Remove the hood assembly.



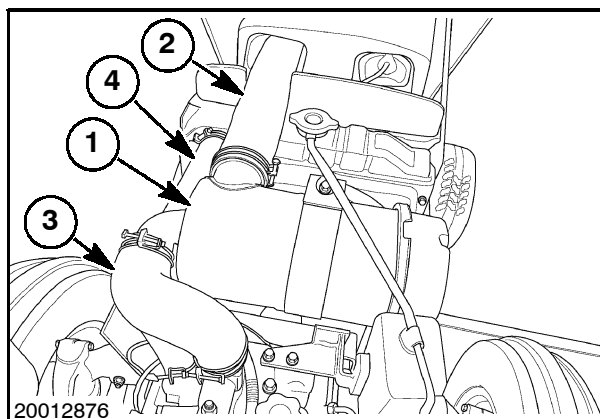
11

2. Drain the coolant from the radiator and engine block through the radiator drain cock, 1.



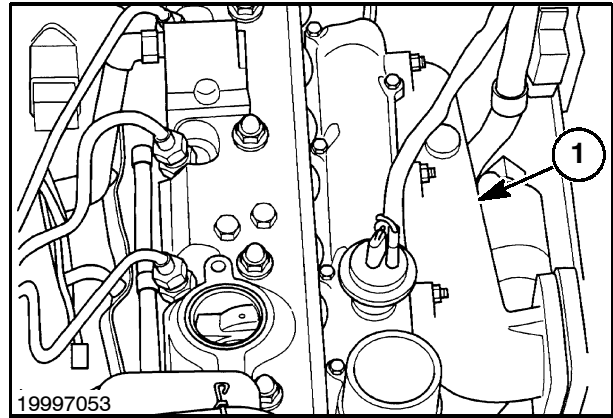
12

3. Remove the air cleaner assembly, 1, along with the air inlet tube, 2, and air outlet tube, 3.
4. Remove the upper radiator hose, 4, from the cylinder head.



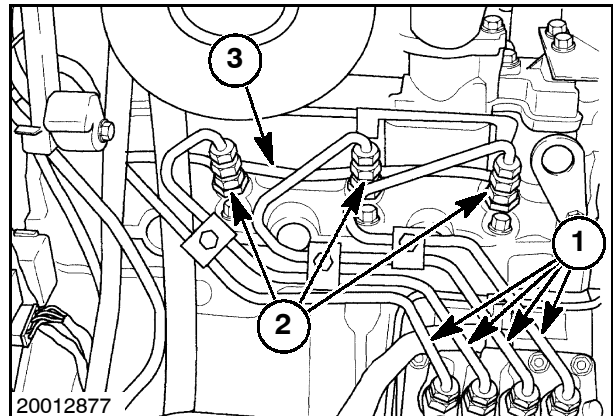
13

5. Remove the exhaust muffler and manifold assembly, 1.



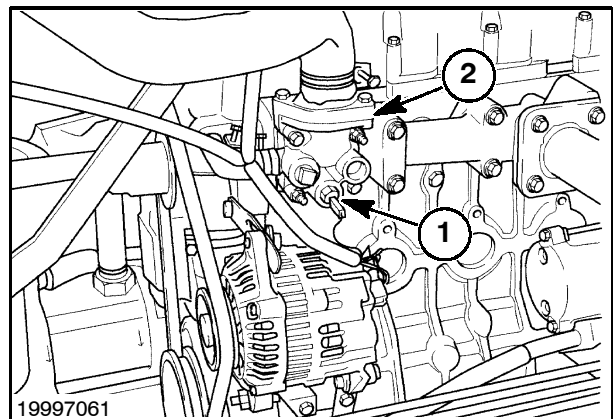
14

6. Remove the fuel injection lines, 1, and fuel leakoff line, 3, and cap all openings.
7. Remove the injector assemblies, 2.



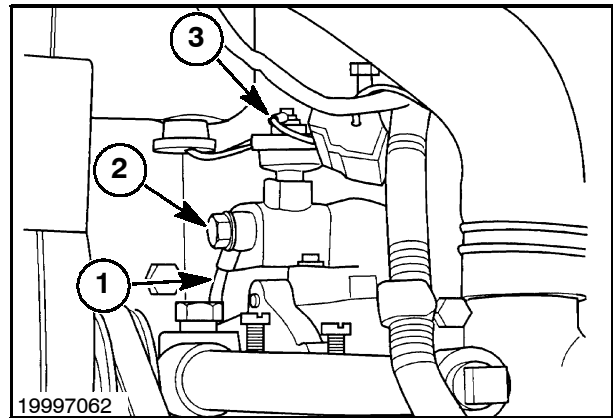
15

8. Remove the thermostat housing, 2, and thermostat.
9. Remove the fuel tank and baffle.



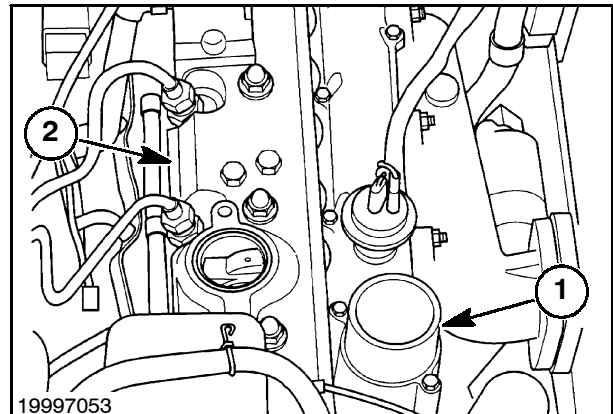
16

10. Remove the oil pressure sensor switch, 3.
11. Remove the external oil tube banjo bolt, 2, from the front end of the valve rocker shaft.



17

12. Remove the air intake manifold, 1.
13. Remove the valve cover assembly, 2.



18

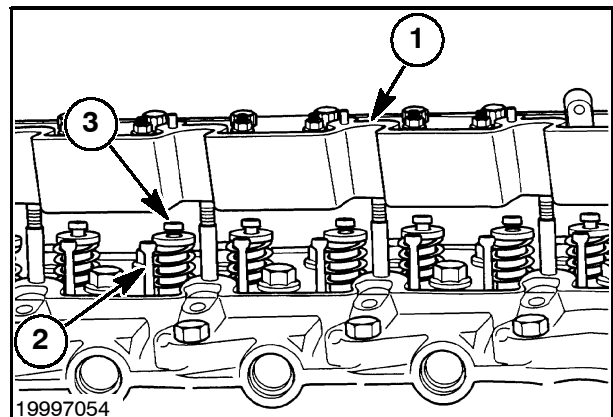
14. Remove the valve rocker support, 1, as an assembly.

NOTE: Alternately loosen the rocker support bolts a turn at a time to prevent distorting the rocker shaft.

15. Remove the valve stem caps, 3, and push rods, 2.

NOTE: Keep all valve components in separately marked containers for reassembly in their original position.

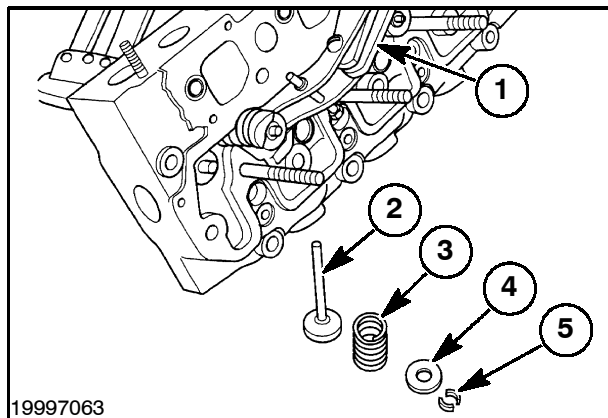
16. Loosen the cylinder head bolts gradually a half turn at a time to prevent warping of the cylinder head and remove the cylinder head.



19

Cylinder Head Disassembly

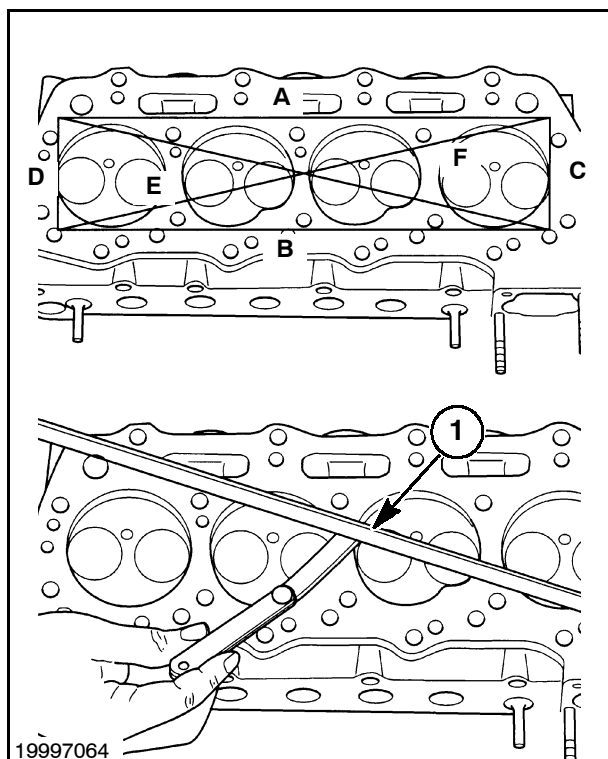
1. Clean the cylinder head and remove any carbon deposits from around the valve heads.
2. Using a valve spring compressor, 1, compress the valve spring, 3, and remove the retainer locks, 5.
3. Release the valve spring compressor and remove the valve spring and retainer, 4.
4. Remove the valves, 2, from the head and place in a numbered container to facilitate identification for installing the components in their original location on assembly.



20

Cylinder Head Inspection and Repair

1. Clean the 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. Check the head for cracks or damage in the following areas:
 - Valve ports.
 - Valve seats.
 - External cracks in the water jackets.
5. Inspect the gasket surfaces for scratches or nicks which would 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 the plugs in the head.
7. Use a straight edge, 1, and feeler gauge and check the cylinder head for warp in the areas shown, (A - F).



21

Resurface or replace the head if warpage is greater than 0.12 mm (0.005").

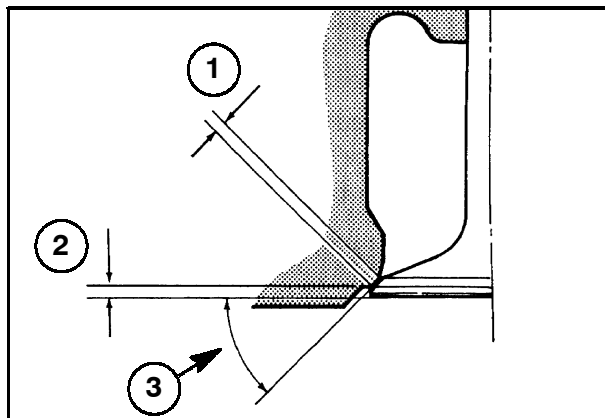
8. Check the push rods for straightness. Replace bent push rods. Do not attempt to straighten.

Valve Seats

Examine the valve seats and reface the seat if damaged.

Valve seat grinding requires that the seat be ground to the correct width and properly positioned.

A valve that extends too deep into the combustion area will result in valve burning and if the valve is recessed too deep into the head it will cause a rapid build-up of carbon deposits.

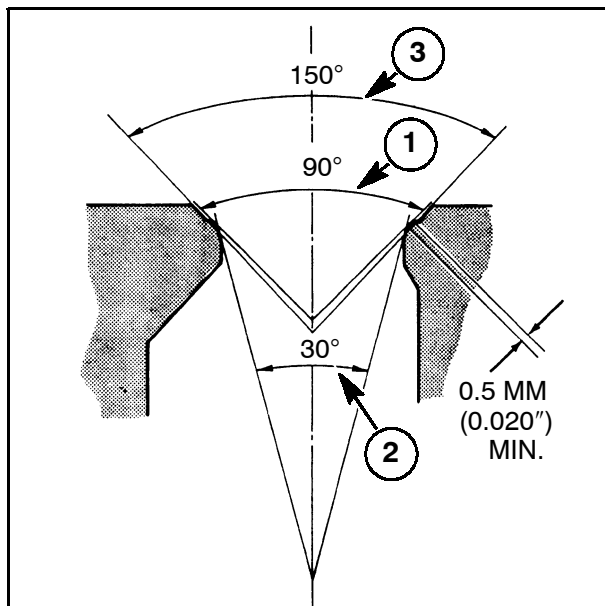


22

1. Correct Valve Seat Width: 1.7 - 2.1 mm (0.067" - 0.0826") - Seat must strike center of valve face
2. Correct Valve Head Margin: 0.775 - 1.075 mm (0.0305" - 0.0420")
3. Angle of Valve Seat: 45°

1. Check the seat for surface defects. Use a 45° stone if necessary to reface. Grind away only enough material to provide a smooth even seat.
2. Check the seat width. If necessary, use a 15° stone to lower the seat contact point and use a 75° stone to raise the seat contact point.

NOTE: Refacing the seat should always be coordinated with refacing of the valve to assure a compression tight fit.

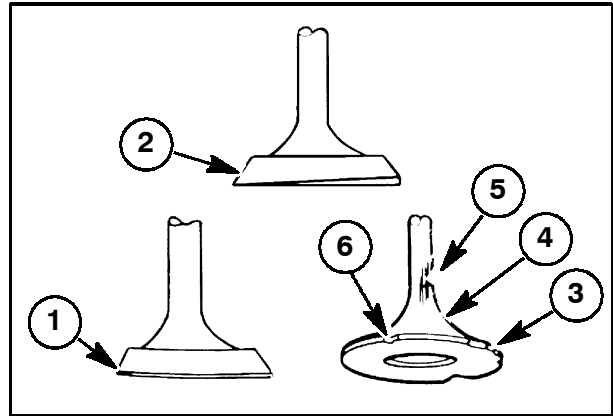


23

1. Seat angle - 45° Stone
2. Lower Seat Location - 15° Stone
3. Raise Seat Location - 75° Stone

Valves

1. Clean all deposits from the valves using a soft wire brush. Inspect the condition of the valve and discard any that are badly burned, cracked or bent.



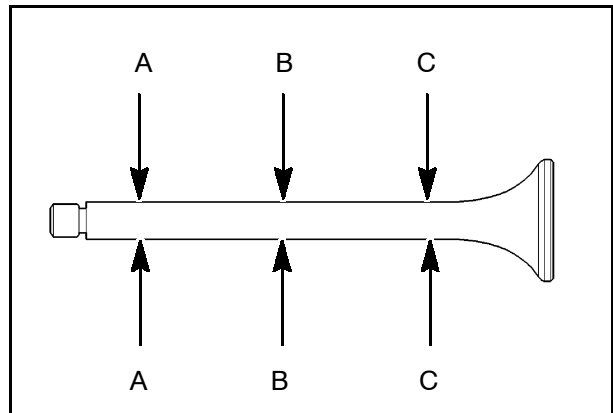
24

1. Margin Too Thin
1920 - 0.5 mm (0.002") Min.
2120 - 1.0 mm (0.039") Min.
2. Bent Valve
3. Pitting
4. Indented
5. Wear or Nicking
6. Burned

2. Using a micrometer, measure the stem diameter at three points "A," "B," and "C."

Replace valves if the stem wear diameter is less than the following dimensions:

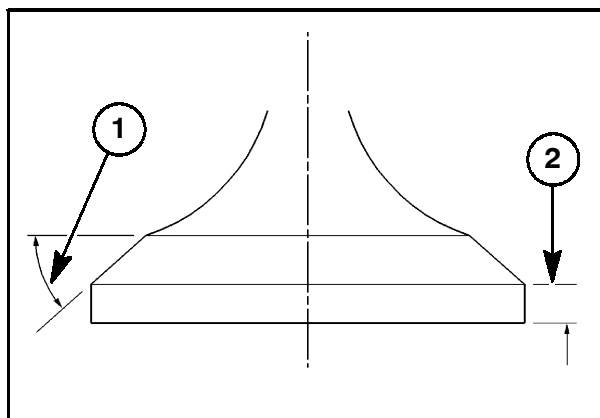
Intake	Exhaust
6.89 mm (0.271")	6.84 mm (0.269")



25

3. If inspection indicates that the valve may be reused, the valve should be ground as shown.

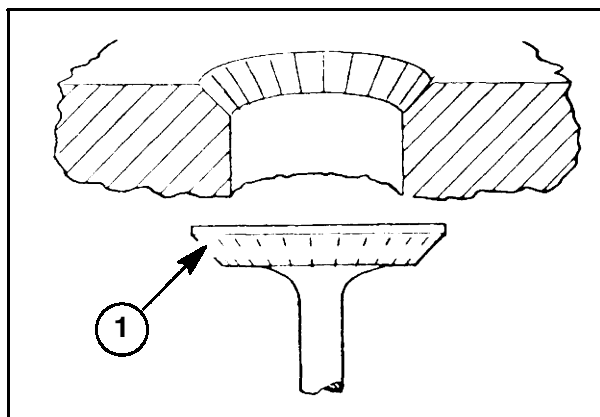
IMPORTANT: After grinding the valve and seat, check to assure that the seat contacts the center of the valve face. Using Prussian Blue, lightly coat the valve seat, place the valve in position and rotate the valve slightly while holding a light pressure against the valve. If the blue is transferred to the center of the valve face, the contact is correct.



26

1. 45° Seat Angle
2. Minimum Valve Margin 0.5 mm (0.002")

If Prussian Blue is not available, mark the valve face or seat with a soft lead pencil as shown. Rotate the valve slightly in the seat. The penciled lines will be broken at the seat contact area.

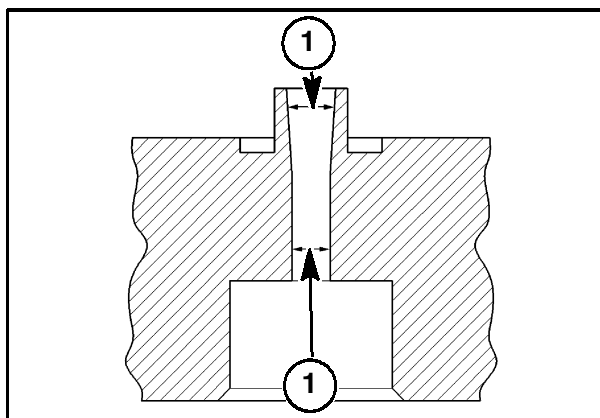


27

Valve Guides

Thoroughly clean the valve guides before attempting to check internal wear.

1. Using a small hole gauge, measure the valve guide bore at the top and bottom wear points, 1.

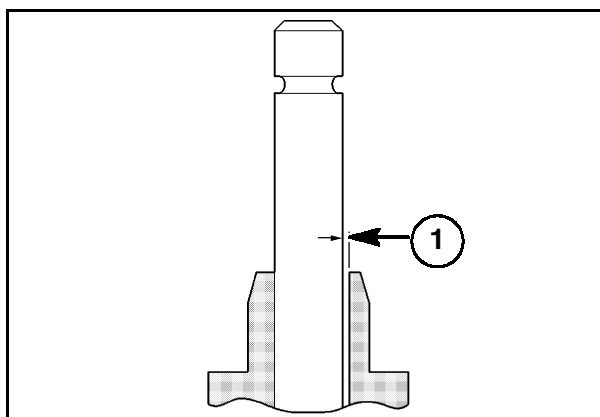


28

2. Determine the stem-to-guide clearance by subtracting the stem diameter from the valve guide. Replace the valves if the clearance is more than the specified limits:

Intake	Exhaust
0.20 mm (0.008") Max	0.25 mm (0.010") Max

3. Replace the cylinder head if excessive clearance is determined. See "Specifications."



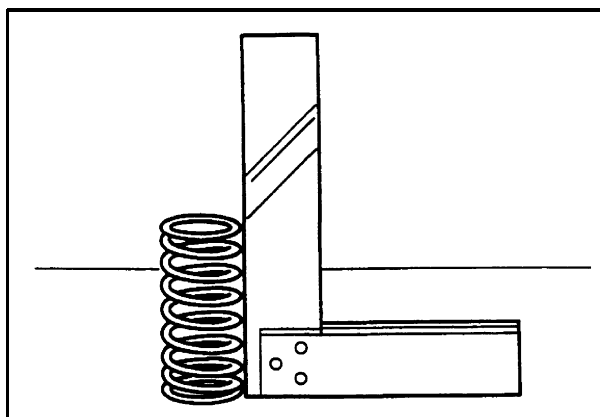
29

Valve Springs

1. Place the valve springs on a flat surface. Measure the free-length of the spring and squareness.

Replace springs that do not meet the following specifications:

	Standard	Maximum
Out of Round	1.2 mm (0.047")	2.0 mm (0.079")
Free Length	35.0 mm (1.378")	33.5 mm (1.319")



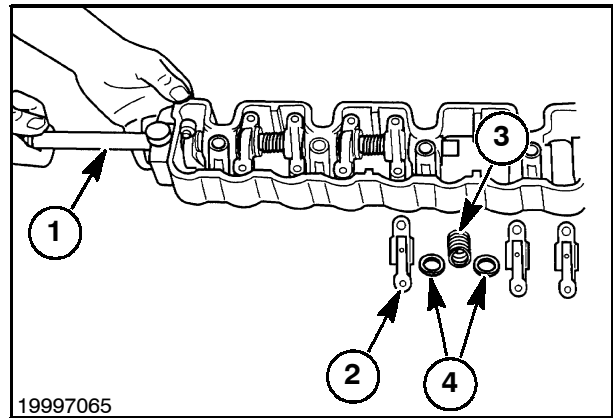
30

2. Place the springs in a suitable spring load tester and measure the spring load rating. Replace the springs that do not meet the following load specifications:

Standard	Minimum
8.1 kg (17.857 lbs) at 30.4 mm (1.197")	7 kg (15.432 lbs) at 30.4 mm (1.197")

Rocker Arm Pivots Disassembly

1. Screw a 8M bolt into the front end of the rocker shaft, 1, and pull the rocker shaft out of the support.
2. Remove the springs, 3, shims, 4, and rocker arms, 2.



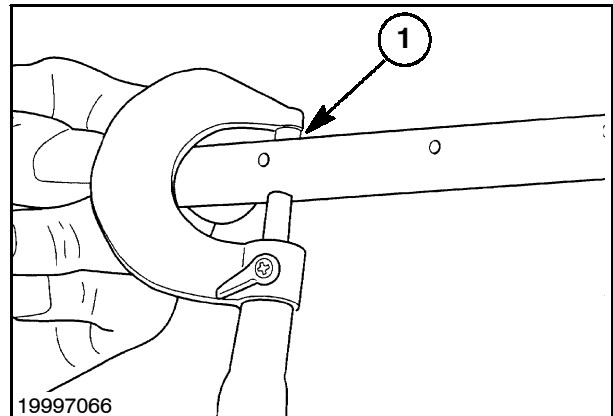
31

Rocker Arm Pivots Inspection and Repair

1. Inspect the rocker arms and shafts for wear of damage.
2. Inspect the valve stem contact area for pitting or wear. Slight wear patterns may be removed using a fine grit stone.
3. Check the adjusting screws for damaged threads or excessive wear.

Replace any components which are visually worn or damaged.

4. Using a micrometer, measure the diameter of the rocker arm shaft, 1.



32

Replace the rocker shaft if the wear at any point exceeds the following diameter:

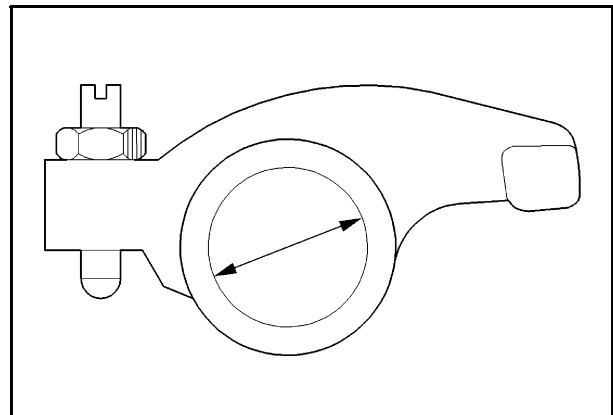
Standard	Minimum
14.95 - 14.97 mm (0.5886" - 0.5894")	14.87 mm (0.5854")

5. Using a hole gauge, measure the inside bore diameter of the rocker arm.

Subtract the rocker shaft diameter from the rocker arm bore diameter to obtain the shaft-to-arm clearance.

Replace the rocker arm and/or shaft assembly if the clearance exceeds the following specifications:

Standard	Maximum
0.032 - 0.068 mm (0.5886" - 0.5894")	0.2 mm (0.008")



33

Push Rods

1. Check all push rods for straightness by rolling on a flat surface. Replace rods which are bent.
2. Inspect the ends of the push rods for excessive wear. If any push rod is worn, the corresponding lifter and rocker arm should also be inspected for excessive wear.

Cylinder Head Assembly

1. Insert each valve into the guide from which it was removed and lightly lap the valve to be sure of an even set all around the valve face.
2. Remove the valve and remove all traces of lapping compound.
3. Using a spring compressor, assemble the valves, springs, retainers and locks.
4. Assemble the rocker arms onto the pivot shafts and install the snap rings.

Cylinder Head Installation

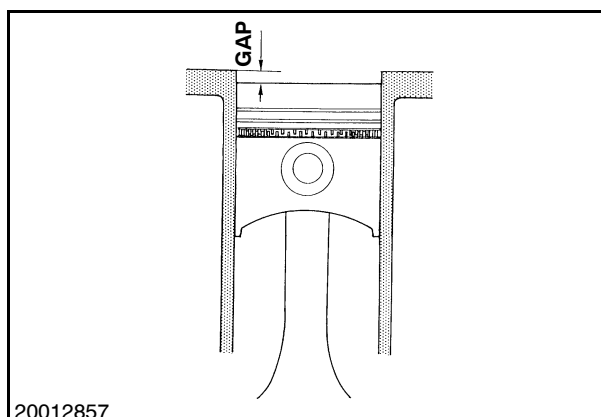
During assembly, the ultimate engine compression ratio is established by the thickness of the head gasket used. For service replacement, head gaskets of different thicknesses are available. The correct head gasket must be selected based upon the position of the piston to the face of the block when at top-dead-center.

The correct head gasket usage is determined as follows:

1. Position each of the pistons at top-dead-center and using a dial indicator, determine the distance of each piston to the face of the block.

NOTE: Measure each of the pistons while holding a slight down pressure on the piston. Use the dimension taken from the cylinder which has the greatest gap and select a head gasket as indicated in the following chart.

The variation between the pistons must not be greater than 0.1 mm (0.004").



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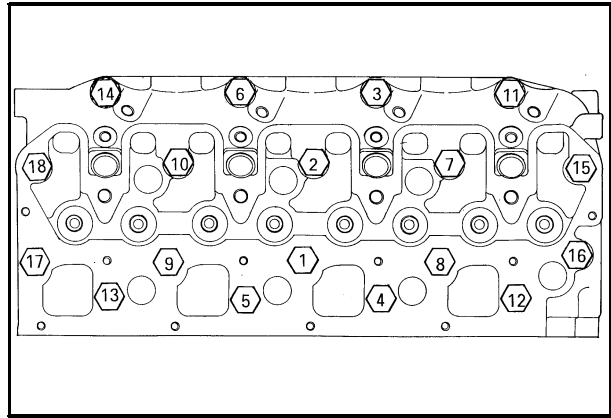
34

MODEL	MEASUREMENT	HEAD GASKET	
		PART NUMBER	THICKNESS
3145	From 0.2 to 0.3 mm (0.0079" to 0.0118")	111147450	0.5 mm (0.0197")
	From 0.3 to 0.4 mm (0.0118" to 0.0157")	111147460	0.4 mm (0.0157")

2. If removed, install the tappets.
3. Select the proper head gasket and place it on the block with the side marked with the last four digits of part no. code, or "top" facing up.

Carefully set the cylinder head in position without disturbing the head gasket.

4. Lubricate the head bolts with engine oil and install the bolts loosely.
5. Gradually tighten the head bolts in stages in sequence as shown.



35

6. Tighten all bolts to the specified torque:

Head bolt torque: 98 - 103 N·m (73 - 77 ft lbs)

7. Replace the push rods and valve stem caps in their original locations.
8. Install the assembled rocker shaft, tighten the support bolts in steps to the specified torque. See "Specifications," Chapter 3.
9. Position the assembled rocker arm and shaft assemblies over the stud bolts and install the nuts and washers.

NOTE: Use care to carefully position the rocker arms over the valve stem caps and push rods.

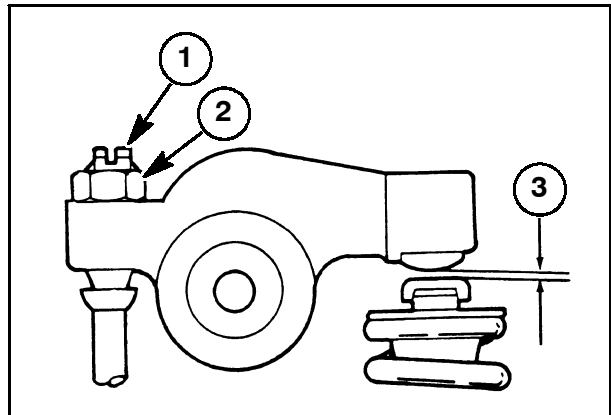
10. Tighten the nuts to the specified torque:

Rocker post stud

nut torque: 27 - 39 N·m (20 - 29 ft lbs)

11. Adjust the valve rocker arms to valve clearance. Be sure the tappet is in its lowest position before making the adjustment. To be sure the tappet is in its lowest position, bring the piston to top-dead-center on the compression stroke (both valves closed).
12. Loosen the adjusting bolt lock nut, 2, and turn the adjusting screw to obtain the specified clearance:

Intake	Exhaust
0.20 mm (0.008") Max	0.20 mm (0.008") Max



36

13. Tighten the locknut.

1. Adjusting Screw
2. Locknut
3. Valve Clearance

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