1.8 & 2.0 LITER O.H.V. 4-CYLINDER

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engine may be identified from the Vehicle Identification Number stamped on a metal tab located on top of instrument panel at lower left of windshield. VIN number code also appears on pad at right front of cylinder block below cylinder head. Engine unit and code number label is found on timing cover. Engine code stamping is found on a pad at left front of cylinder block below cylinder head. The VIN number contains 17 digits. The 8th digit identifies engine and the 10th digit establishes model year.

Engine Code

Engine	Code
1.8L (112")	G
2.0L (122")	B

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

INTAKE MANIFOLD

Removal – **1)** Disconnect negative battery terminal. Remove air cleaner. Drain cooling system. Disconnect necessary vacuum lines and electrical wires. Remove idler pulley.

2) If equipped, remove power steering drive belt. Disconnect steering pump and lay aside. Remove air pump drive belt. Remove air pump bracket-to-manifold bolt.

3) If equipped with power steering, remove air pump pulley, air pump through bolt and power steering adjusting bracket. Loosen air pump mounting bracket lower bolt.

4) Disconnect fuel line and linkage and remove carburetor. Remove E.F.E. grid. Remove distributor hold-down bracket bolt and remove distributor.

5) Remove attaching nuts and bolts and remove manifold. Disconnect heater hose and condenser from bottom of intake manifold.

Installation – **1)** Clean mating surface of intake manifold and cylinder head. Position new intake manifold gasket on cylinder head.

2) Install intake manifold and attaching bolts and nuts. Tighten manifold attaching nuts and bolts. Reverse removal procedure to complete installation.

NOTE – *After installation is completed, check timing and idle speeds.*

EXHAUST MANIFOLD

Removal – **1)** Disconnect negative battery terminal. Remove air cleaner and hot air duct assembly. Remove exhaust manifold shield. Raise vehicle. Disconnect exhaust pipe at manifold.

2) Lower vehicle. Disconnect air management-to-check valve hose and bracket. Remove oil dipstick tube retaining screw. If equipped with air conditioning, remove suction-line bracket.

3) Disconnect wire at oxygen sensor. Remove alternator drive belt. Loosen adjustment bolts and pivot bolt and pivot alternator upward. Remove alternator brace. Remove air pump pipe bracket bolt.

4) Remove exhaust manifold retaining bolts and remove manifold and air pump plumbing as an assembly.

NOTE – *If exhaust manifold is to be replaced, disconnect air pump plumbing from manifold.*

Installation – Clean all mating surfaces on exhaust manifold and cylinder head. Position manifold against head and install manifold attaching bolts and tighten. Reverse removal procedure to complete installation.

CYLINDER HEAD

Removal – **1)** Disconnect negative battery terminal. Remove air cleaner. Drain cooling system. Remove exhaust manifold shield. Raise vehicle. Disconnect exhaust pipe at manifold.

2) Remove heater hose from intake manifold. Lower vehicle. Remove engine lift bracket. Remove distributor. Disconnect vacuum manifold at alternator bracket. Disconnect all remaining vacuum lines to intake manifold and thermostat.

3) Remove air management pipe at exhaust check valve. Disconnect accelerator linkage at carburetor and remove linkage bracket. Disconnect all necessary wires. Remove upper radiator hose. Remove dipstick tube and hot water bracket.

4) Remove idler pulley. If equipped, remove power steering drive belt, then disconnect pump and lay side. Remove air pump drive belt. Remove air pump bracket-to-manifold bolt. If equipped with power steering, remove air pump pulley, air pump through bolt and power steering adjusting bracket.

5) Loosen air pump mounting bracket lower bolt. Disconnect fuel line at carburetor. Remove alternator with wires and lay aside. Remove rocker arm cover. Remove rocker arms and push rods. Remove cylinder head bolts. Remove cylinder head, carburetor, intake manifold and exhaust manifold as an assembly.

NOTE – *If cylinder head is to be serviced, carburetor, intake manifold and exhaust manifold must be detached from head.*

Installation – **1)** Clean gasket surfaces on cylinder head and block. Insure that all gasket surfaces are free of nicks, heavy scratches and foreign materials.

2) Position cylinder head gasket on block using dowel pins as a guide. Carefully lower head into place seating head on dowel pins. Coat head bolt heads and threads with sealing compound. Install head bolts and tighten in proper sequence shown in *Fig. 1*.

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

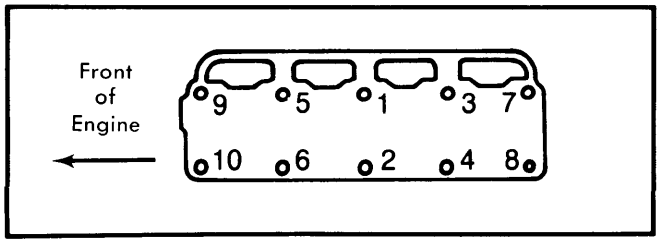

Fig. 1 Cylinder Head Tightening Sequence

VALVES

VALVE ARRANGEMENT

E-I-I-E-E-I-I-E

VALVE GUIDE SERVICING

Valves with oversize stems are available in .089" (2.26 mm), .394" (10.00 mm) and .775" (19.68 mm) diameters. To ream valve guide bores for oversize valves, use valve reamer tool (J-5330-1, 2 or 3) respectively.

VALVE STEM OIL SEALS/SPRINGS

Removal – **1)** Remove rocker arm cover. Remove spark plug, rocker arm and push rod on cylinder to be serviced. Install air adaptor tool (J-23590 or equivalent) to spark plug hole.

2) Apply compressed air to hold valve in place. Using valve spring compressor tool, compress spring. Remove valve locks, cap, spring, valve stem oil seal and shim.

Installation – Reverse removal procedure to complete installation. Make sure locks seat in upper groove. Adjust valves.

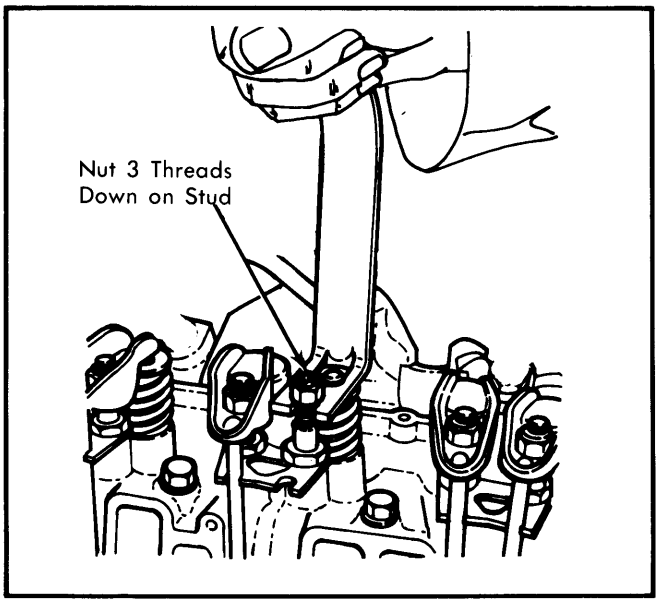

Fig. 2 Compressing Valve Spring

VALVE SPRING INSTALLED HEIGHT

Using a thin narrow scale, measure from top of spring seat to bottom of cap. If measurement exceeds specified height, install a shim .028" (.7 mm) thick to correct spring height. See *Fig. 3*.

CAUTION – *At no time should a spring be shimmed to give a spring height under minimum specifications.*

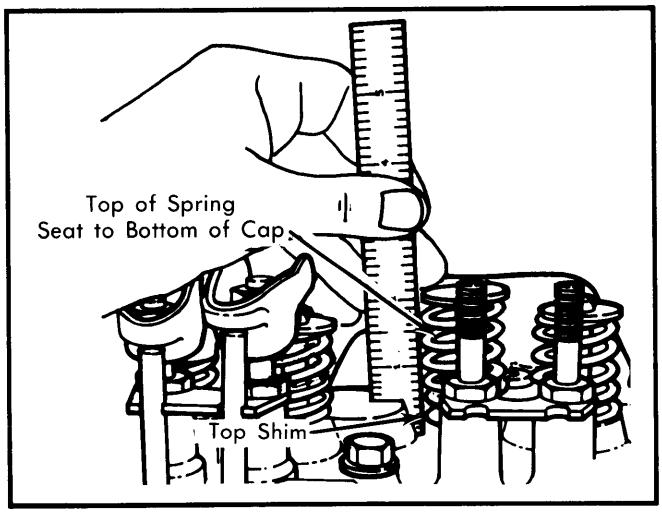

Fig. 3 Measuring Valve Spring Installed Height

Valve Spring Installed Height

Application	Installed Height In. (mm)
1.8L & 2.0L	①1.6 (40.6)

① – Plus Shim.

HYDRAULIC VALVE LIFTER ASSEMBLY

Lifters are serviced as assemblies only and parts are not interchangeable. It is important to place lifters in order for proper installation in original position. Thoroughly clean and inspect lifter assemblies and fill with SAE 10W oil to reassemble. Before installing lifters, coat bottom of lifter with Molykote (or equivalent).

HYDRAULIC VALVE LIFTER ADJUSTMENT

NOTE – *Valves must be adjusted when lifter is on base circle of camshaft lobe.*

1) Using starter, rotate engine until No. 1 cylinder is at TDC on compression stroke. The following valves may be adjusted: No. 1 and 2 intake; No. 1 and 3 exhaust.

2) To adjust, back off adjusting nut until lash is felt at push rod. Tighten adjusting nut until all lash at push rod is removed.

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

Turn adjusting nut an additional 1½ turns to center lifter plunger.

3) Rotate engine 360°. Adjust the following valves: No. 3 and 4 intake; No. 2 and 4 exhaust. Install rocker arm cover.

NOTE – *Check timing and idle speed.*

PISTONS, PINS & RINGS

OIL PAN

See Oil Pan Removal at end of ENGINE Section.

PISTON & ROD ASSEMBLY

Removal – 1) Inspect cylinder bores above ring travel area. If ridge is present, remove by using a ridge reamer tool. Using a silver pencil or quick drying paint, mark all pistons, connecting rods and caps for identification to insure correct installation.

NOTE – *When removing ridge in cylinder bore, place clean cloth on top of piston to collect cuttings.*

2) Remove rod bearing cap and install guide hose over threads of rod bolts to protect bearing journal. Push piston and rod assembly out top of cylinder bore.

Installation – 1) Lubricate connecting rod bearings with clean engine oil. Install bearings in rod and rod caps. Coat pistons, rings and cylinder walls lightly with oil.

2) Install guide hose over connecting rod bolts. Make sure ring gaps are spaced as shown in *Fig. 4*. Install ring compressor tool on piston.

NOTE – *Be sure to install new pistons in same cylinder for which they were fitted and used pistons from cylinder in which they were removed.*

3) Install piston and rod assembly with notch and hole on piston facing toward front of engine and connecting rod tang slot on opposite side of camshaft.

4) Remove guide hose from connecting rod bolts. Using a hammer handle, tap lightly on piston and guide rod onto crankshaft journal. Install bearings and caps and tighten.

FITTING PISTONS

NOTE – *When fitting new pistons a feeler gauge of .0019" (.050 mm) in thickness is used. A feeler gauge of .0023" (.060 mm) thickness is used for fitting used pistons. The feeler gauge must be at least 6" (150 mm) long and not over .50" (13 mm) wide.*

1) Select a piston without rings which will slide through cylinder bore freely. Insert piston and feeler gauge into cylinder bore until bottom of piston skirt is .47-.98" (12-25 mm) from top of cylinder bore.

2) Ensure that feeler gauge is at 90° angle to piston pin. If piston hangs on feeler gauge and does not fall free, piston is correctly fitted to that cylinder bore.

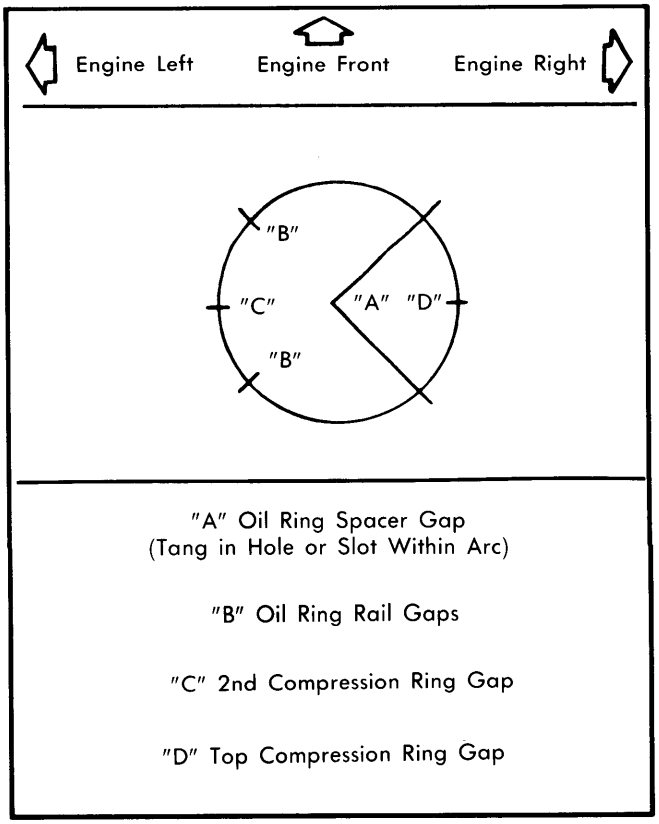

Fig. 4 Piston Ring Gap Spacing

PISTON PINS

Removal – Install piston and connecting rod assembly on fixture and support tool (J-24086-20 or equivalent) and place in an arbor press. Press pin out of connecting rod.

Installation – Lubricate piston pin holes in piston and connecting rod lightly with oil. Position connecting rod in piston and hold in place with piston pin guide and piston pin. Using support tool and arbor press, press pin into piston and connecting rod.

CAUTION – *After arbor press hub bottoms on support assembly, do not exceed 5000 psi pressure or tool will be damaged.*

CRANKSHAFT & ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

Connecting Rod Bearings – 1) Connecting rod bearings are precision insert type and do not utilize shims for adjustment. After ensuring that rod caps are marked for identification, remove rod caps. Use Plastigage method to check for proper bearing clearances.

NOTE – *Place piece of Plastigage the full width of crankpin, as contacted by bearing and parallel to crankshaft.*

2) If clearances are found to be excessive, a new bearing will be required. Service bearings are available in standard size and .005" (.13 mm) and .0010" (.025 mm) undersize for use with new and used standard size crankshafts.

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

CAUTION — *If bearing is fitted to an out-of-round crankpin, be sure to fit to maximum diameter of crankpin. If bearing is fitted to minimum diameter and crankpin is out-of-round .0009" (.023 mm), interference between bearing and crankpin will result causing rapid bearing failure. Do not file rods or rod caps.*

Main Bearings — 1) Main bearings are precision insert type and do not utilize shims for adjustment. If clearances are excessive, both upper and lower halves are to be replaced.

2) Wipe oil from crankshaft journal, bearing and cap. If engine is out of vehicle and upside down, crankshaft will rest on upper bearings and total clearance can be measured between lower bearing and journal.

3) If engine is to remain in vehicle support crankshaft at front and rear to remove clearance from upper bearings. When checking No. 1 bearing, loosen accessory drive belts to prevent tapered reading on Plastigage.

NOTE — *Bearing cap bolts must be evenly tightened to specification in order to assure proper reading.*

4) Always replace upper and lower inserts as a unit. A standard, .0006" (.016 mm) and .0009" (.022 mm) undersize bearing should produce proper clearance. If not, it will be necessary to regrind crankshaft journal for use with next undersize bearing.

NOTE — *Install main bearing cap with arrows pointing toward front of engine.*

THRUST BEARING ALIGNMENT

Install all main bearing caps except thrust bearing and tighten. Install thrust bearing cap and bolts finger tight. Using soft-face hammer, tap end of crankshaft rearward, then forward. Retighten all main bearing caps and measure crankshaft end play. See *Fig. 5*.

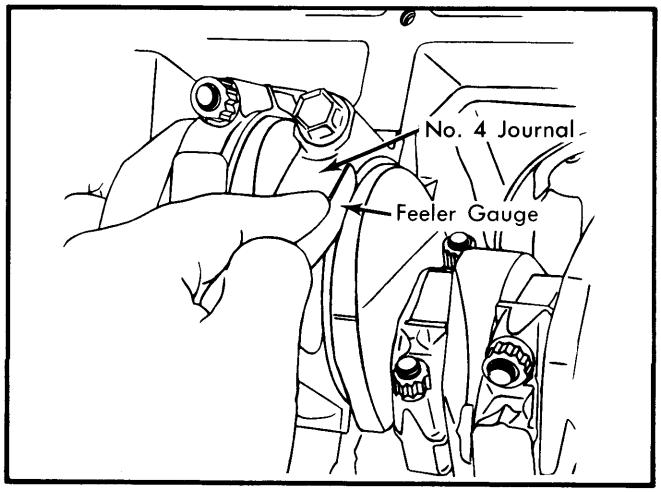

Fig. 5 Measuring Crankshaft End Play

REAR MAIN BEARING OIL SEAL

NOTE — *The following procedures are performed with the oil pan and oil pump removed.*

Removal & Installation — 1) Remove rear main bearing cap. Using packing tool (J-29114-2) gently drive upper seal into groove approximately .250" (6.35 mm) on both sides of block.

2) Measure the distance seal was driven into block and add .063" (1.60 mm) to that measurement. Using a sharp tool, cut that length from old seal which was removed from rear main bearing cap.

NOTE — *Use rear main bearing cap as a holding fixture when cutting seal.*

3) Install guide tool (J-29114-1) onto cylinder block as shown in *Fig. 6*. Using packing tool, work the short pieces of old seal cut from rear main bearing cap onto guide tool.

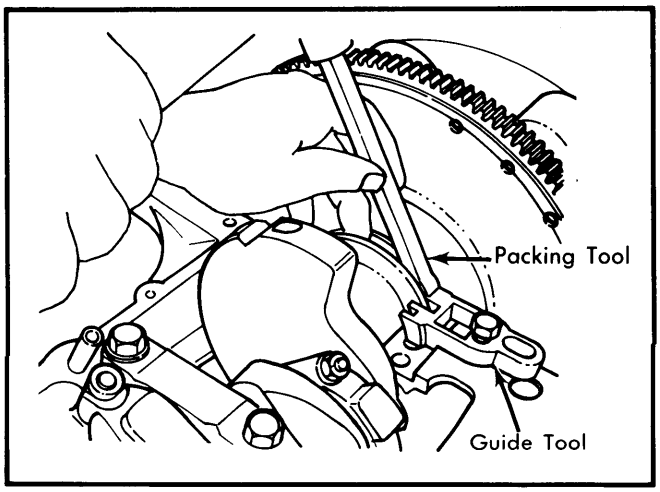

Fig. 6 Rear Main Seal Installation

4) Using packing tool, pack the short pieces of seal into cylinder block. The guide tool and packing tool have been machined to provide a built in stop.

5) Install a new rope seal into bearing cap. Install seal tool (J-29590) in bearing cap and cut ends of seal flush with cap.

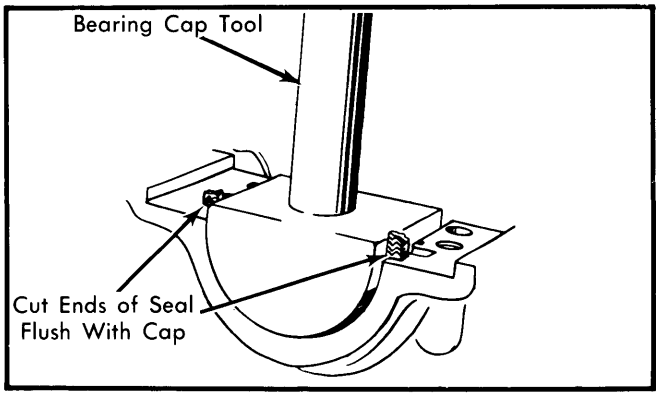

Fig. 7 Installing Rear Main Seal Lower Half

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

6) Place a piece of Plastigage on rear main journal and install bearing cap and tighten. Remove bearing cap and check Plastigage for proper bearing clearance.

NOTE – *If bearing clearance is out of specification, inspect ends of seal for fraying which would prevent cap from fully seating.*

7) Clean Plastigage from journal and bearing. Apply a thin film of anaerobic sealant to bearing cap as shown in *Fig. 8*.

8) Apply a light coat of oil on crankshaft surface that will contact seal. Install main bearing cap and tighten. Reverse removal procedure to complete installation.

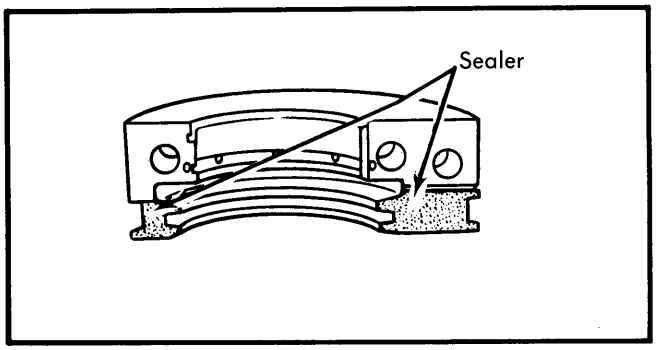

Fig. 8 Sealer Application to Bearing Cap

CAMSHAFT

ENGINE FRONT COVER

Removal – 1) Disconnect negative battery terminal. Remove accessory drive belts. Raise vehicle. Remove right front tire and wheel.

2) Remove right front inner fender splash shield. Remove hub pulley retaining bolts and remove hub pulley.

3) Install hub puller tool (J-24420) on hub and remove hub. Remove front cover retaining bolts and remove front cover.

Installation – 1) Clean mating surfaces on block and front cover. Apply a bead of sealer to cover.

NOTE – *Keep sealer out of cover bolt holes. At time of installation, flanges must be free of oil and sealer must be wet to touch.*

2) Install centering tool (J-23042) in front cover seal. Position front cover on block, install retaining bolts and tighten. Reverse removal procedure to complete installation.

FRONT COVER OIL SEAL

Removal – With hub removed, carefully pry seal out of cover, taking care not to damage surface of crankshaft.

Installation – Install new seal with open end toward inside of cover. Using seal driver tool (J-23042 or equivalent), drive seal into cover. Reverse removal procedure to complete installation.

TIMING CHAIN

Removal – 1) With front cover removed align marks on camshaft sprocket with marks on crankshaft sprocket as shown in *Fig. 9*.

2) Loosen chain tensioner nut as far as possible without removing it completely. Remove camshaft sprocket and timing chain.

3) Crankshaft sprocket can be removed using puller tool (J-2288-8-20 or puller legs J-22888-11).

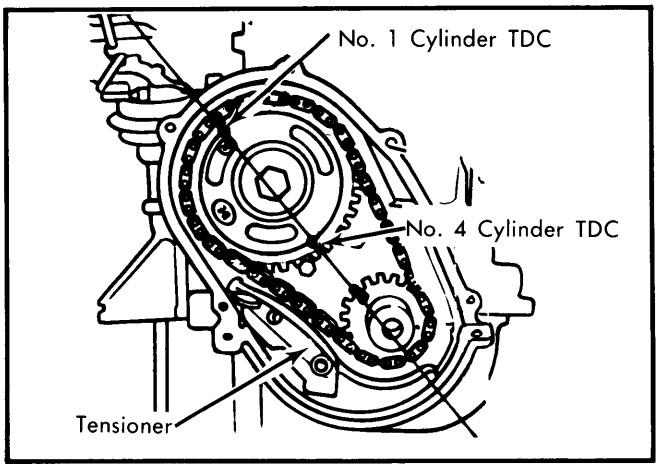

Fig. 9 Timing Chain Sprocket Alignment

Installation – 1) If crankshaft sprocket was removed, install sprocket using sprocket tool (J-5590). Lubricate thrust surface of camshaft with Molykote (or equivalent).

2) Position chain over camshaft and crankshaft sprockets, making sure marks on camshaft sprocket align with mark on crankshaft sprocket.

3) Position camshaft sprocket on camshaft making sure hole in camshaft sprocket aligns with dowel pin on camshaft.

4) Draw camshaft sprocket onto camshaft using camshaft retaining bolts and tighten. Lubricate timing chain with oil. Reverse removal procedure to complete installation.

CAMSHAFT

Removal – 1) With engine removed from vehicle, remove valve lifters. Remove engine front cover. Mark position of rotor and remove distributor.

NOTE – *Use extreme care when removing camshaft, as all journals are same size and damage to bearing may result.*

2) Remove fuel pump and push rod. Remove timing chain and camshaft sprocket. Remove thrust plate retaining bolts and remove thrust plate. Remove camshaft.

Installation – 1) Measure camshaft journals for an out of round condition. If journals are out of round in excess of .0009" (.022 mm), camshaft should be replaced.

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

2) Lubricate camshaft with G.M. E.O.S. or suitable lubricant. Lubricate camshaft journals with engine oil and install camshaft. Reverse removal procedure to complete installation.

CAMSHAFT BEARINGS

Removal – 1) With camshaft and crankshaft removed, remove camshaft rear cover. Using bearing removal tool (J-6098) fasten nut and thrust washer to end of threads.

2) Insert tool pilot in camshaft front bearing and install puller screw through pilot. Install tool with shoulder toward bearing with sufficient amount of threads engaged.

3) Using an additional wrench to hold puller screw stationary, turn nut until bearing is pulled from block. Remove remaining bearings (except front and rear).

4) Insert pilot in camshaft rear bearing to remove rear intermediate bearing. Assemble tool on driver handle and remove front and rear bearings by driving toward center of cylinder block.

Installation – 1) Using bearing removal tool, fasten nut and thrust washer to end of threads. Insert pilot in camshaft bearing and install puller screw through pilot.

2) Insert bearing in bore with oil hole aligned at 2:30 o'clock position on rear and intermediate bearing. Front bearing has oil holes at 11:00 and 2:30 o'clock position.

3) Using additional wrench to hold puller screw stationary, turn nut until bearing is pulled into bore. Install remaining bearings in same manner.

4) Apply RTV sealer to groove in engine block and camshaft rear cover. Position camshaft cover on block, install retaining bolts and tighten. Reverse removal procedure to complete installation.

ENGINE OILING

Crankcase Capacity – Four quarts with or without filter change.

Oil Filter – Full flow type. Change at first oil change and every other one thereafter.

ENGINE OILING SYSTEM

A gear type oil pump provides full pressure lubrication through a full flow oil filter. Oil is drawn up through screen and tube and passed through pump to oil filter.

From filter, oil is routed to main oil gallery, and rifle drilled holes above camshaft to left of camshaft centerline and on to lifters.

Lifter pumps oil through push rods to rocker arms. Oil draining back from arms is directed by cast dams (which are a part of crankcase casting) to supply camshaft lobes with oil.

Passages supplying oil to camshaft bearings also supply crankshaft bearings through passages drilled in crankshaft.

OIL PUMP

Removal – With oil pan removed, remove pump to rear main bearing cap bolt. Remove pump and extension shaft.

Disassembly – 1) Remove pump cover attaching bolts and remove cover. Mark gears for reassembly in same position.

2) Remove idler gear, drive gear and shaft from pump body. Remove pressure regulator valve retaining pin and remove pressure regulator spring and valve.

3) If pick-up screen and pipe assembly are to be replaced, place pump in a soft-jawed vise. Extract pipe from pump cover.

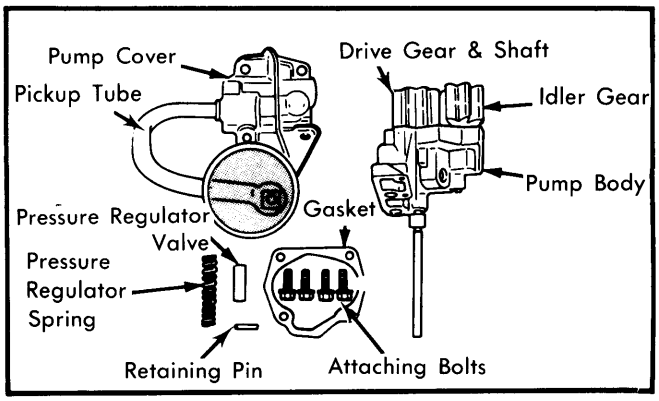

Fig. 10 Oil Pump Component Identification

NOTE – *Pick-up screen is not removable from pipe and must be replaced as an assembly.*

Inspection – 1) Wash all parts in solvent and dry with compressed air. Inspect pump body and cover for cracks or excessive wear.

2) Inspect gears for damage or excessive wear. Check for looseness of drive gear shaft in body.

NOTE – *The pump gears and pump body cannot be serviced separately. If either gears or pump body is worn or damaged, replace entire oil pump assembly.*

3) Inspect pump cover for wear that would allow oil to leak past ends of gears.

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

4) Inspect pick-up screen and pipe assembly for damage. Check pressure regulator for fit in pump body.

Reassembly – 1) If pick-up screen and pipe assembly was removed, it should be replaced. Loss of press fit could cause an air leak resulting in loss of oil pressure.

NOTE – *Be careful of twisting, shearing or collapsing pipe when installing it in pump body.*

2) Position pump in a soft-jawed vise. Apply sealer to end of pipe. Using pipe installer tool (J-8369) and soft faced hammer, tap the pipe into place.

3) Reverse disassembly procedure to complete reassembly.

Installation – 1) Assemble pump and extension shaft with retainer to rear main bearing cap.

2) Align end of shaft with lower end of distributor drive gear. Align pump with 2 dowel pins at bottom of cap.

3) Install pump to rear bearing cap retaining bolt and tighten. Reverse removal procedure to complete installation.

ENGINE COOLING

WATER PUMP

Removal – 1) Disconnect negative battery terminal. Drain cooling system. Remove accessory drive belts. Remove alternator.

2) Remove water pump pulley retaining bolts and remove pulley. Remove water pump retaining bolts and remove water pump.

Installation – 1) Clean all gasket surfaces. Apply sealer to pump gasket and position gasket on pump.

2) Position pump on engine, install retaining bolts and tighten. Reverse removal procedure to complete installation.

NOTE – *For further information on cooling system capacities and other cooling system components, see appropriate article in ENGINE COOLING SYSTEMS Section.*

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)
Camshaft Sprocket	66-85 (90-116)
Connecting Rod Caps	34-40 (46-54)
Cylinder Head Bolts	65-75 (88-102)
Crankshaft Pulley Hub	66-84 (90-114)
Crankshaft Pulley	20-30 (27-41)
Exhaust Manifold	22-28 (30-38)
Flywheel-to-Crankshaft	45-55 (61-75)
Intake Manifold	20-25 (27-34)
Main Bearing Caps	63-74 (86-101)
Oil Pump	26-35 (35-47)
Rocker Arm Stud	43-49 (58-66)
Water Pump	13-18 (18-24)
Application	**INCH Lbs. (N·m)**
Cam Thrust Plate	72-108 (8-12)
Front Cover	72-108 (8-12)
Oil Pump Cover	72-108 (8-12)
Rocker Arm Cover	72-108 (8-12)

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Engine	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
				in.	mm	in.	mm
1.8L (112″)	.....	.....	9.0:1	3.50	89	2.91	74
2.0L (122″)	.....	.....	9.0:1	3.50	89	3.15	80

VALVES

Engine & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
1.8L (112″) & 2.0L (122″)							
Int.	1.595-1.605 (40.51-40.77)	45°	46°	.049-.059 (1.25-1.50)	.3139-.3144 (7.973-7.986)	.0011-.0026 (.028-.066)	.393 (9.98)
Exh.	1.373-1.383 (34.87-35.13)	45°	46°	.063-.075 (1.60-1.90)	.3129-.3136 (7.948-7.965)	.0014-.0031 (.035-.078)	.393 (9.98)

1.8 & 2.0 LITER O.H.V. 4-CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
1.8L (112″) & 2.0L (122″)	.0008-.0018 (.020-.046)	.00026-.00036 (.0065-.0091)	.0007-.0020 (.019-.052)	1	.010-.020 (.25-.50)	.0012-.0027 (.030-.068)
				2	.010-.020 (.25-.50)	.0012-.0027 (.030-.068)
				3	.....	.0008 (.199)
					.....	

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.① In. (mm)	Clearance② In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
1.8L (112″) & 2.0L (122″)	2.4945-2.4954 (63.360-63.384)	.0006-.0019 (.015-.047)	No. 4	.002-.007 (.05-.18)	1.9983-1.9994 (50.758-50.784)	.0010-.0031 (.025-.079)	.004-.024 (.10-.61)

① — No. 5 Journal is 2.4937-2.4946″ (63.340-63.364 mm).
② — No. 5 bearing clearance is .0014-.0027″ (.036-.068 mm).

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1.8L (112″) & 2.0L (122″)	....	77@1.6 (342@40.6)	182@1.3 (810@33.9)

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1.8L (112″) & 2.0L (122″)	1.868-1.870 (47.44-47.49)	.0010-.0040 (.026-.101)	.262 (6.65)