2.2 LITER 4-CYLINDER

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engine may be identified from the Vehicle Identification Number (VIN) stamped on a gray colored metal tab located on top of instrument panel at lower left of windshield. VIN number code also appears as part of a production or unit number stamped on left rear of cylinder block, below cylinder head. The VIN number contains 17 digits. The 8th digit identifies the engine and the 10th digit establishes the model year.

Engine Code

Engine	Code
2.2L (135") 2-Bbl.	B

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

INTAKE & EXHAUST MANIFOLDS

Removal – 1) Disconnect battery. Drain cooling system. Remove air cleaner and disconnect all electrical wiring, vacuum lines and fuel lines at carburetor. Remove throttle linkage. If equipped, loosen power steering pump and remove belt.

2) Remove water hoses from water crossover. Raise vehicle on hoist and remove exhaust pipe at manifold. If equipped, remove power steering pump from mounting brackets and position aside, leaving hoses connected. Remove intake manifold support bracket. Remove EGR tube.

3) Remove intake manifold bolts, lower vehicle, and remove intake manifold. Remove exhaust manifold bolts and remove exhaust manifold.

Installation – 1) Clean all gasket surfaces and inspect for cracks, distortion and/or surface flatness. Gasket surfaces must be flat within .006" (.15 mm) per foot of manifold length. Coat cylinder head side of intake and exhaust manifold gasket with suitable sealer and install on cylinder head.

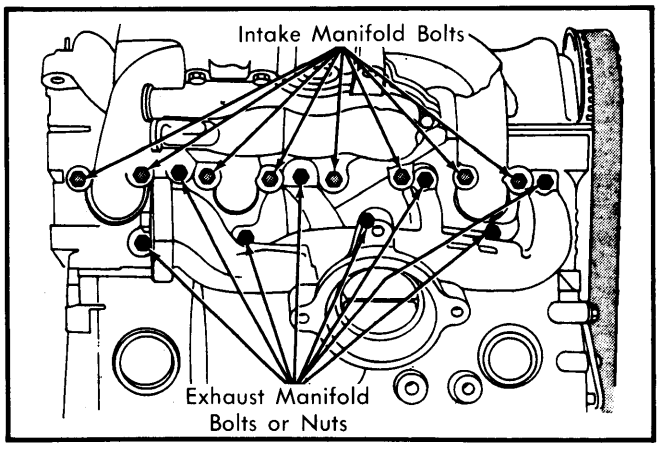

Fig. 1 Removal and Installation of Intake and Exhaust Manifolds

2) Position exhaust manifold on cylinder head and install bolts. Tighten bolts or nuts, starting in center and working outward in both directions. Position intake manifold on cylinder head and install bolts. Tighten bolts, starting in center and working outward in both directions. Reverse removal procedure to complete installation.

CYLINDER HEAD

Removal – 1) Remove intake and exhaust manifolds as previously described. Remove alternator and mounting brackets and position aside. If equipped, remove A/C compressor and mounting brackets and position aside, leaving refrigerant lines connected.

2) Remove water pump and crankshaft pulley bolts and remove pulleys. Raise vehicle on hoist and remove right inner fender splash shield. Remove crankshaft pulley. Remove upper and lower timing belt cover. Position jack under engine.

3) Remove right engine mounting bolt and raise engine slightly. Loosen timing belt tensioner and remove timing belt. Remove camshaft cover. Install camshaft sprocket tool (C-4687 or equivalent) and hold sprocket while removing sprocket bolt. Remove camshaft sprocket.

4) Remove AIR pump pulley bolt and remove pulley, making sure not to turn camshaft when removing AIR pump pulley. Loosen and remove cylinder head bolts in reverse order (number 10 to number 1) of installation. Remove cylinder head and gasket.

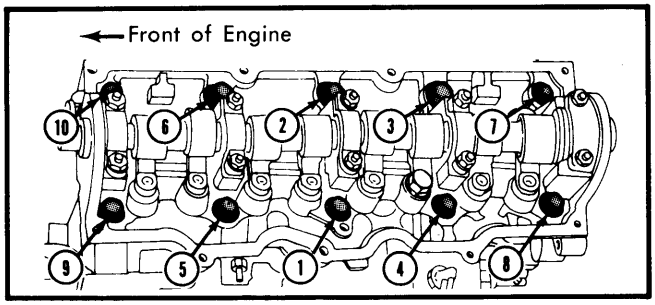

Fig. 2 Cylinder Head Tightening Sequence (Loosen in Reverse Order – No. 10 to No. 1)

Installation – 1) Clean all gasket surfaces. Check cylinder head and block for distortion. If more than .004" (.10 mm) distortion on either cylinder head or block, surface cylinder head and/or block.

2) Place new gasket on block, install cylinder head and head bolts, tightening in 3 steps: 1st to 30 ft. lbs. (41 N•m); 2nd to 45 ft. lbs. (61 N•m); 3rd, check again at 45 ft. lbs. (61 N•m) and turn another 1/4 turn. *See Fig. 2.*

3) Reverse removal procedure to complete installation and note the following: Install camshaft sprocket and sprocket tool (C-4687 or equivalent) and hold sprocket while installing sprocket bolt. Turn crankshaft and intermediate shaft until timing marks on sprockets are in line.

4) Turn camshaft until arrows on hub are in line with No. 1 camshaft cap-to-cylinder head line. Small hole in sprocket must be at 12 o'clock position. Install timing belt and timing belt tensioner tool (C-4703 or equivalent) horizontally on large hex of belt tensioner pulley and loosen tensioner lock nut.

5) If necessary, reset belt tensioner tool to have axis within 15° of horizontal. Turn engine clockwise from TDC 2 complete

2.2 LITER 4-CYLINDER (Cont.)

revolutions to TDC. Tighten tensioner lock nut while holding belt tensioner wrench in position.

NOTE – *Do not reverse rotate crankshaft or rotate engine by turning camshaft sprocket bolt or intermediate shaft sprocket bolt during timing belt adjustment.*

VALVES

VALVE GUIDE INSPECTION

Insert valve with valve head positioned .400" (10 mm) above cylinder head gasket surface. Attach dial indicator to cylinder head and position against valve head at right angle to valve stem. Rock valve in guide and measure guide wear as shown on dial indicator. Maximum clearance is .002" (.05 mm) on intake valves and .0027" (.07 mm) on exhaust valves. If valve guide clearance is excessive, guides should either be reamed to next oversize or replaced. Service valves are available in .006" (.15 mm), .016" (.40 mm) and .032" (.80 mm) oversize.

NOTE – *Do not ream valve guides from standard to maximum oversize. Ream guides oversize in steps so guides may be reamed true in relation to valve seat.*

VALVE GUIDE REPLACEMENT

NOTE – *Cylinder head must be supported with suitable alignment fixture when pressing guides in or out.*

1) Thoroughly clean cylinder head gasket surface and alignment fixture bed surface of any foreign material. Position cylinder head on fixture with head gasket side down, so valve guides are vertical.

2) Position guide removal tool on guide and press out using a press with a rated 3-ton capacity. Ream cylinder head guide bores to .499-.500" (12.675-12.700 mm) diameter. Thoroughly clean guide bores and replacement guides.

3) Place new guides in dry ice for a minimum of 30 minutes. Lubricate guide bores with engine oil and place guide on installation tool and carefully align in guide bore.

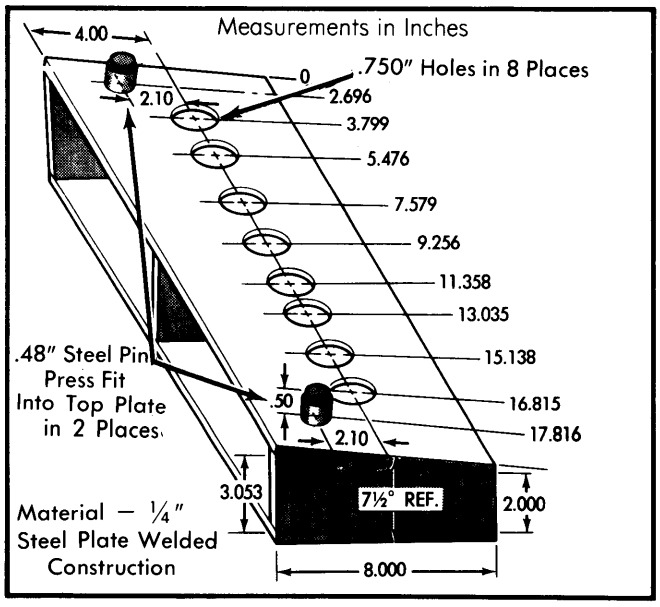

Fig. 3 Cylinder Head Alignment Fixture

NOTE – *Long guides are for exhaust valves and short guides are for intake valves.*

4) Make sure groove on valve guide is at upper end for valve stem seal retention. Press guide in slowly until tool seats on cylinder head. The inside diameter of guide is pre-drilled for correct stem-to-guide clearance, so reaming is not required.

VALVE STEM OIL SEALS

Oil seals are installed on all valve stems and must be replaced whenever valve service is performed. *See Valve Spring Removal for disassembly.* Lightly coat valve stems with engine oil and install new seals. Push seals firmly and squarely over guide so center bead of seal seats in groove on valve guide and lower edge of seal is resting on valve guide boss. When oversize valves are used, make sure oversize seals are used also.

NOTE – *Excessive valve guide wear may result if oversize seals are not used with oversize valves.*

VALVE SPRINGS

Removal – 1) Remove camshaft cover. Mark rocker arms for reinstallation in original positions. On each rocker arm, rotate camshaft until base circle of cam is in contact with rocker arm.

2) Install spring compressor tool (4682 or equivalent) and compress valve spring. Remove rocker arm and keep in order for reinstallation. Remove hydraulic lash adjuster. Rotate crankshaft until piston of cylinder concerned is at TDC.

3) Remove spark plug and install air line adapter to spark plug port and apply 90-120 psi air pressure to hold valves closed. Install spring compressor tool (4682 or equivalent) and compress valve spring. *See Fig. 4.*

4) Remove valve locks, valve spring, retainer and valve spring seat. Remove oil seal by gently prying oil seal side-to-side using screwdriver blade until seal is dislodged from valve guide groove.

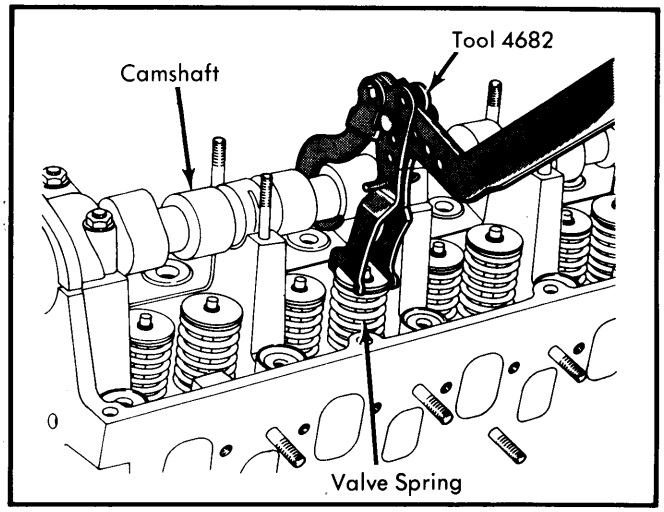

Fig. 4 Removal and Installation of Valve Spring Assembly

Installation – 1) Test valve springs using spring tester (C-647 or equivalent). Replace springs if not within 10 lbs. of specifications. Install oil seals, valve spring seats, valve springs and retainers.

2.2 LITER 4-CYLINDER (Cont.)

2) Using spring compressor tool (4682 or equivalent), compress valve spring and install valve locks. Reverse removal procedure to complete installation.

VALVE SPRING INSTALLED HEIGHT

Measure valve spring installed height from lower edge of valve spring to upper edge. Do not include valve spring seat or retainer. Specified height is 1.62-1.68" (41.20-42.70 mm). If valve seats have been reground, an additional spring seat may be required to maintain proper spring height.

VALVE STEM INSTALLED HEIGHT

Measure valve stem installed height from tip of valve stem to valve seal boss. Specified height is 1.659-1.679" (42.15-42.65 mm). Check clearance after grinding valves or seats. If necessary, grind tip of valve stem to obtain clearance when valve is installed in cylinder head. *See Fig. 5.*

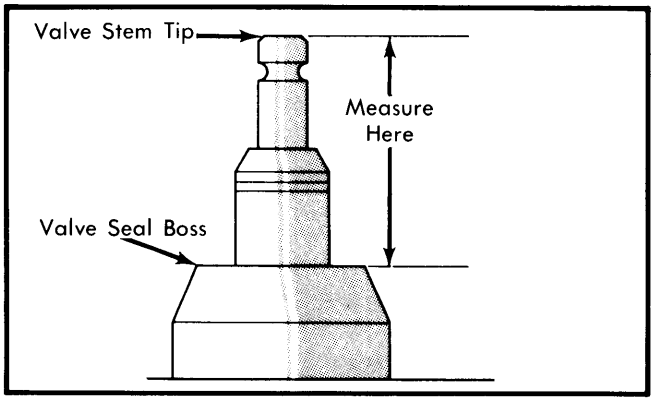

Fig. 5 Measuring Valve Stem Installed Height

ROCKER ARM ASSEMBLY

Install hydraulic valve lash adjusters and rocker arms in original positions. Measure rocker arm-to-valve stem installed height between projecting ears of rocker arms on either side of valve stem tip and valve spring retainer. Specified clearance should be a minimum of .020" (.50 mm). If clearance is not sufficient, grind rocker arm ears as required to obtain clearance.

HYDRAULIC VALVE LASH ADJUSTERS

NOTE – *Lash adjusters are serviced as complete assemblies only. Parts are not interchangeable.*

No adjustment of lash adjusters is required. Servicing of adjusters requires only that care and cleanliness be exercised in handling of parts. If disassembled for cleaning purposes, reassemble using new spring clip. Adjusters must be full of oil prior to installation and oiling holes in cylinder head must be free of any obstruction.

DRY LASH

Dry lash is amount of clearance between base circle of an installed camshaft and the rocker arm pad, when the adjuster is completely collapsed. Remove and drain adjuster of any engine oil to perform this check. Install adjuster and completely collapse. Measure clearance between base circle and rocker arm pad using feeler gauge. Specified clearance is .024-.060" (.62-1.52 mm). If not within specifications, check wear on parts and replace as required. Refill adjusters with engine oil before final assembly and allow 10 minutes for adjusters to bleed down before rotating camshaft.

PISTONS, PINS & RINGS

OIL PAN

See Oil Pan Removal at end of ENGINE Section.

PISTON & ROD ASSEMBLY

Removal – 1) With cylinder head and oil pan removed, use suitable ridge reamer to remove any deposits or ridge from top of cylinder bore.

NOTE – *Piston must be at bottom of stroke and covered with cloth to collect cuttings.*

2) If necessary, mark connecting rods and caps for cylinder identification and reinstallation in original positions. Remove rod cap nuts and remove rod cap. Push piston and rod assembly out top of cylinder block.

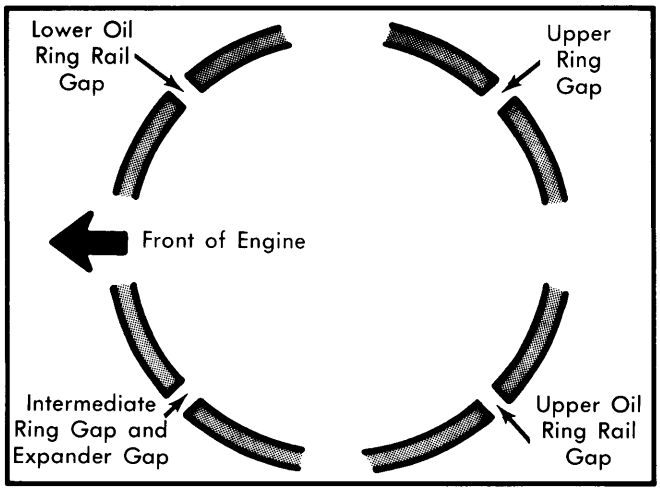

Fig. 6 Piston Ring Gap Spacing

Installation – 1) Lightly coat piston rings and cylinder bores with engine oil. Make sure "TOP" mark on upper and intermediate piston rings point toward top of piston. Make sure ring gaps are properly spaced on upper and intermediate rings, and that oil ring rail gaps are installed 180° apart from each other. *See Fig. 6.*

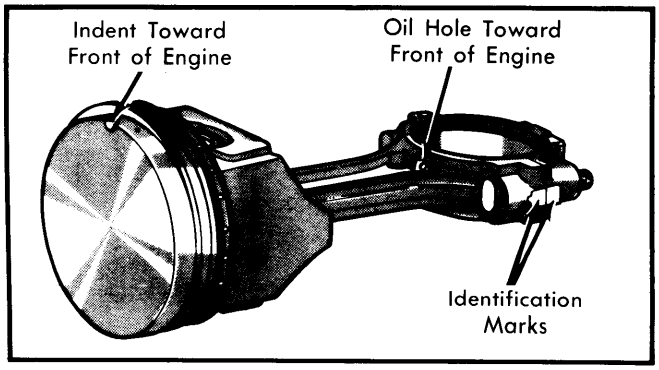

Fig. 7 Piston and Rod Installation

2.2 LITER 4-CYLINDER (Cont.)

2) Rotate crankshaft so connecting rod journal is at center of cylinder bore. Install suitable rod bolt protectors before installing piston and rod assembly in block. Using ring compressor, compress rings and install piston in cylinder bore with indent on piston and oil hole in connecting rod pointing toward timing belt side of engine. *See Fig. 7.*

FITTING PISTONS

1) Measure cylinder bore at 3 points: 3/8" (10 mm) down from top, and 3/8" (10 mm) up from bottom of bore, and at center of bore. Measure in line with thrust face and at 90° angle to thrust face. Cylinder bore wear limit is .0027 (.07 mm). Maximum cylinder out-of-round is .005" (.12 mm), and maximum cylinder bore taper is .010" (.25 mm).

2) Measure pistons with pins removed at points "A", "B", "C" and "D". First, measure point "B". Piston diameter should be 3.443-3.445" (87.442-87.507 mm). Now measure point "A": Due to elliptical shape of piston skirt, point "A" should be .011-.013" (.28-.33 mm) less than measurement taken at point "B". *See Fig. 8.*

3) Measure point "C" and point "D". Piston diameter at point "D" should be .0005" (.0152 mm) more than measurement taken at point "C". Measure piston diameter at ring lands on head of piston. Measurement should be .021-.028 (.53-.71 mm) less than measurement taken at point "C".

4) If piston is not within specifications, replace as required. Pistons are available in standard and .020" (.50 mm) oversize.

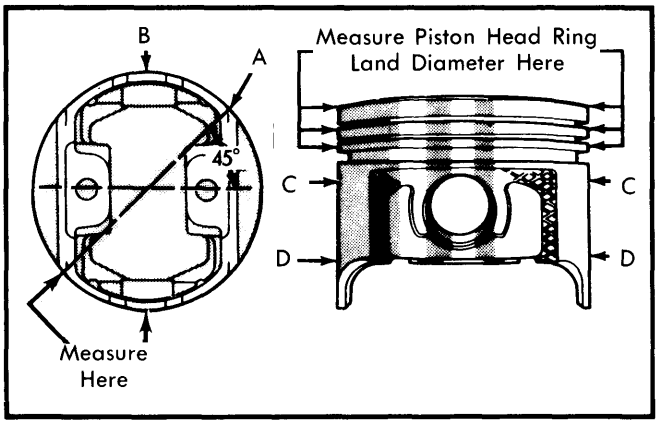

Fig. 8 Measuring Piston Fit

FITTING RINGS

1) Place cylinder block upside down. Position ring in cylinder block into bore that it will be used in. Using head of piston, push ring squarely into bore 5/8" (16 mm).

2) Measure gap between ends of ring using feeler gauge. If not within specifications, substitute another ring set until rings are within specifications.

CAUTION – *Use care to avoid damage to ring or cylinder bore.*

PISTON PINS

Pins are press fit in rods. Remove and install piston pins using arbor press and suitable adapters. With piston and rod separated, inspect pin and pin bore for wear and measure clearance. If pin bore clearance exceeds .00075" (.019 mm), replace piston and pin as an assembly.

CRANKSHAFT & ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

NOTE – *Main and connecting rod bolts are torqued using new method. Before torquing bolts, bolt threads should be checked for "necking" by holding a straightedge against threads. If threads do not fully touch straightedge, bolt should be replaced.*

Connecting Rod Bearings – 1) Use Plastigage method to check rod bearings. Turn crankshaft until connecting rod to be checked just starts moving toward top of engine. Place Plastigage across full width of lower bearing ¼" (6.35 mm) off center and away from oil holes.

2) Install rod cap and tighten nuts to 40 ft. lbs. (55 N•m). Remove rod cap and determine amount of clearance by measuring width of compressed Plastigage with scale furnished on package. Clearance should be .0004-.0025" (.010-.064 mm).

3) If clearance exceeds specifications, bearings must be replaced. New bearings are available in standard, .001" (.025 mm) and .002" (.050 mm) undersize for use with standard size crankshaft. Bearings are also available in .010" (.250 mm), .011" (.275 mm), .012" (.300 mm), .020" (.500 mm) and .030" (.750 mm) undersize for use with reconditioned crankshaft.

NOTE – *Do not use bearings with more than .001" (.025 mm) difference in size on same journal.*

4) Check rod journal for out-of-round condition. If journals are more than .002" (.03 mm) out-of round, crankshaft must be reconditioned or replaced. When all bearings have been checked and/or replaced, measure rod side clearance using feeler gauge. Clearance should be .013" (.32 mm).

NOTE – *If clearance cannot be brought within specifications, grind crankshaft to next size undersize. If already at maximum undersize, replace crankshaft.*

Main Bearings — 1) Use Plastigage method to check main bearings. To remove weight from crankshaft, shim main bearings adjacent to bearing being checked using a minimum .010" (.25 mm) shim placed between bearing and cap and tighten bolts to 10-15 ft. lbs. (1.3-2.4 N•m).

2) Remove main cap and bearing. Place Plastigage across full width of lower bearing 1/4" (6.35 mm) off center and away from oil holes. Install main bearing cap with bearing and tighten bolts to 30 ft. lbs. (41 N•m).

3) Remove main cap and determine amount of clearance by measuring width of compressed Plastigage with scale furnished on package. Clearance should be .0008-.0030" (.020-.080 mm). If clearance exceeds specifications, bearings must be replaced.

4) New bearings are available in standard, .001" (.025 mm) and .002" (.050 mm) undersize for use with standard size crankshaft. Bearings are also available in .010" (.250 mm), .011" (.275 mm), .012" (.300 mm), .020" (.500 mm) and .030" (.750 mm) undersize for use with reconditioned crankshaft.

NOTE – *Do not use bearings with more than .001" (.025 mm) difference in size on same journal.*

5) Check crankshaft journal for out-of-round condition. If journals are more than .002" (.03 mm) out-of-round, crankshaft

2.2 LITER 4-CYLINDER (Cont.)

must be reconditioned or replaced. When all bearings have been checked and/or replaced, measure crankshaft end play using dial indicator.

6) Mount dial indicator on front of engine with stem on nose of crankshaft. Move crankshaft all the way rearward and zero dial indicator. Move crankshaft all the way forward and read dial indicator reading. End play should be .002-.007" (.05-.18 mm).

CRANKSHAFT SPROCKET OIL SEAL

Removal – 1) Remove timing belt cover and remove timing belt. Remove crankshaft sprocket bolt. Install tool (4524-1 or equivalent) in end of crankshaft.

2) Install puller tool (C-4685 or equivalent) and remove crankshaft sprocket. Install oil seal removal tool (C-4679 or equivalent) and remove oil seal, being careful not to nick shaft seal surface or seal bore.

Installation – Lightly coat outside diameter of new oil seal with Loctite (or equivalent) and position seal and seal installer tool (C-4680 or equivalent) flush with front oil seal retainer and install seal flush with retainer. Reverse removal procedure to complete installation.

REAR MAIN BEARING OIL SEAL

Removal – Engine or transmission must be removed for seal service. Using large screwdriver, pry out seal from crankshaft oil seal retainer, being careful not to nick or damage flange seal surface or retainer bore.

Installation – Lightly coat outside diameter of new oil seal with Loctite (or equivalent) and position seal and seal installer tool (C-4681 or equivalent) flush with retainer and tap into place using plastic hammer.

CAMSHAFT

TIMING BELT

Removal – 1) Disconnect battery. Remove alternator and mounting brackets and position aside, leaving wiring connected. If equipped, remove A/C compressor and mounting brackets and position aside, leaving refrigerant lines connected. Remove water pump and crankshaft pulley bolts and remove pulleys.

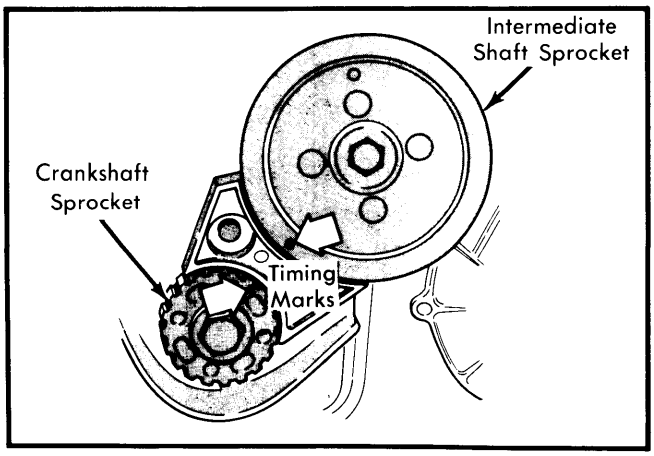

Fig. 9 Crankshaft and Intermediate Sprocket Timing Marks

2) Raise vehicle on hoist and remove right inner fender splash shield. Remove crankshaft pulley. Remove upper and lower timing belt cover. Position jack under engine. Remove right engine mounting bolt and raise engine slightly. Loosen timing belt tensioner and remove timing belt.

NOTE – *Do not allow oil or solvent to contact timing belt as it will deteriorate the rubber, causing belt to skip teeth.*

Installation – 1) Align timing marks on crankshaft and intermediate sprockets. See *Fig. 9*. Turn camshaft sprocket until arrows on hub are in line with No. 1 camshaft cap-to-cylinder head line. Small hole must be at 12 o'clock position. See *Fig. 10*.

2) Install timing belt and timing belt tensioner tool (C-4703 or equivalent) horizontally on large hex of belt tensioner pulley and loosen tensioner lock nut.

3) If necessary, reset belt tensioner tool to have axis within 15° of horizontal. Turn engine clockwise from TDC 2 complete revolutions to TDC. Tighten tensioner lock nut while holding belt tensioner wrench in position.

NOTE – *Do not reverse rotate crankshaft or rotate engine by turning camshaft sprocket bolt or intermediate shaft sprocket bolt during timing belt adjustment.*

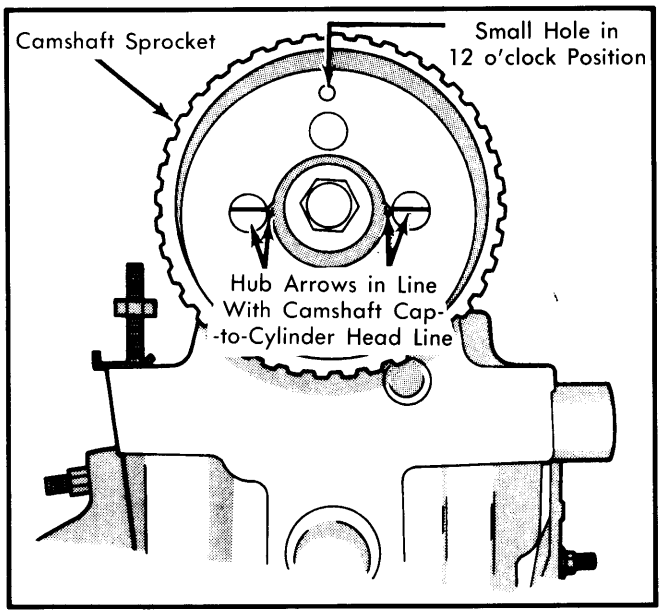

Fig. 10 Camshaft Timing Marks

CAMSHAFT

Removal – 1) Remove timing belt cover and remove timing belt. Install camshaft sprocket holding tool (C-4687 or equivalent) and remove sprocket bolt and sprocket. Remove camshaft cover. Mark rocker arms for reinstallation in original positions.

2) On each rocker arm, rotate camshaft until base circle of cam is in contact with rocker arm. Install spring compressor tool (4682 or equivalent) and compress valve spring. Remove rocker arm and keep in order for reinstallation.

3) Loosen camshaft bearing cap nuts several turns. Using soft-faced mallet, tap rear of camshaft to loosen bearing caps.

2.2 LITER 4-CYLINDER (Cont.)

Remove camshaft cap nuts and bearing caps in manner such that cam does not cock in cylinder head, and remove camshaft and oil seals.

CAUTION – *Do not cock camshaft during removal as damage to camshaft and/or bearing thrust surfaces could result.*

Installation – 1) Check bearing cap oil holes for blockage. Install camshaft into cylinder head and align bearing caps in proper sequence, with bearing cap No. 1 at timing belt end and bearing cap No. 5 at transmission end.

2) Make sure arrows on bearing caps No. 1, 2, 3 and 4 point toward timing belt to prevent bearing cap breakage. Apply RTV sealer to No. 1 and No. 5 bearing caps at sealing surfaces. Install bearing cap nuts and tighten.

3) Mount dial indicator at timing belt end of camshaft and slide cam rearward. Zero dial indicator and slide cam all the way forward and read dial indicator reading. End play should be .006" (.15 mm) maximum. If end play exceeds specification, camshaft and/or cylinder head should be replaced.

4) Lightly coat outside diameter of new oil seals with Loctite (or equivalent) and position seal and seal installer tool (C-4680 or equivalent) flush with camshaft bearing cap. Install seal flush with cap. Reverse removal procedure to complete installation.

INTERMEDIATE SHAFT

Removal – 1) Remove fuel pump and distributor assembly. Remove timing belt cover and remove timing belt. Install intermediate sprocket holding tool (C-4687 or equivalent) and remove sprocket bolt and sprocket.

2) Remove oil seal using oil seal removal tool (C-4679 or equivalent), being careful not to nick shaft seal surface or seal bore. Remove intermediate shaft retainer bolts, retainer and intermediate shaft.

3) Remove intermediate shaft front bushing using bushing removal tool (C-4697 or equivalent), and remove intermediate shaft rear bushing using bushing removal tool (C-4686-2 or equivalent).

Installation – 1) Install intermediate shaft rear bushing using bushing installer tool (C-4686-1 or equivalent) until tool is flush with block. Install intermediate shaft front bushing using bushing installer tool (C-4697-1 or equivalent) until tool is flush with block.

2) Install intermediate shaft, retainer and bolts and tighten. Lightly coat outside diameter of new oil seal with Loctite (or equivalent) and position seal and seal installer tool (C-4680 or equivalent) flush with oil seal retainer. Install oil seal flush with retainer.

3) Install intermediate sprocket and sprocket holding tool (C-4687 or equivalent). Install sprocket bolt and tighten. Align intermediate shaft, crankshaft and camshaft sprocket timing marks. See *Figs. 9 and 10*. Align slot in oil pump shaft parallel to centerline of crankshaft.

4) Remove distributor cap and align rotor to No. 1 firing position and install in engine. Install fuel pump. Install distributor cap. Reverse removal procedure to complete installation.

VALVE TIMING

See Timing Belt.

ENGINE OILING

Crankcase Capacity – 4 quarts with or without filter change.

Oil Filter – Replace every 2nd oil change.

Normal Oil Pressure – 50 psi @ 2000 RPM.

Pressure Relief Valve – Relief valve is serviceable, but not adjustable.

OIL PUMP

Removal – Remove bolt holding oil pickup tube to No. 3 main bearing cap bolt. Remove bolt on pump cover holding oil pickup tube to oil pump and remove pickup tube and "O" ring. Remove 2 bolts holding oil pump to cylinder block and remove pump.

Disassembly – Remove 5 oil pump cover-to-pump housing bolts and remove pump cover. Remove gear and rotor. Remove oil pressure relief valve pin, cap, spring and valve from oil pump housing.

Inspection – Install gear and rotor into pump housing and check gear end play by placing straightedge across pump housing. Using feeler gauge, measure clearance between gear and straightedge. Clearance should be .001-.006" (.03-.15 mm). Using micrometer, measure rotor thickness. Minimum thickness should be .825" (20.96 mm). Now measure rotor diameter. Minimum diameter should be 2.469" (62.70 mm). Using feeler gauge, measure gear-to-rotor clearance. Maximum clearance should be .019" (.25 mm). Now measure rotor-to-pump housing clearance. Maximum clearance should be .014" (.35 mm). Place straightedge across pump cover and measure pump cover wear using feeler gauge. Maximum clearance should be .015" (.38 mm). If any measurement is not within specifications, replace oil pump as an assembly.

Reassembly – Install rotor with large chamfered edge facing down into pump housing. Install drive gear. Install pump cover with 5 attaching bolts and tighten. Insert pressure relief valve, spring, cap and pin into pump housing.

Installation – Reverse removal procedure, making sure to install new "O" ring seal on pickup tube and align slot in oil pump shaft parallel to centerline of crankshaft.

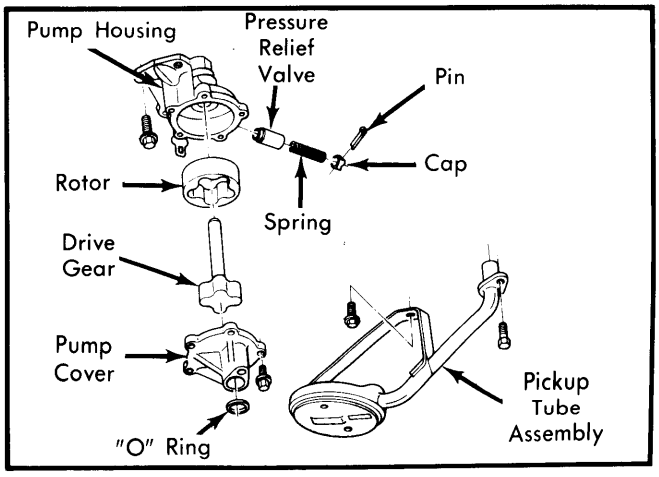

Fig. 11 Exploded View of Oil Pump Assembly

2.2 LITER 4-CYLINDER (Cont.)

ENGINE COOLING

WATER PUMP

Removal — Disconnect negative battery cable and drain system. Remove upper radiator hose and remove air conditioning compressor from engine bracket and set aside. Remove alternator and lay aside. Remove water pump by disconnecting lower hose, bypass hose and 4 bolts holding water pump to engine.

Installation – **1)** If installing new water pump, transfer pulley from old pump. Clean all sealing surfaces.

2) Apply a 1/8" bead of sealer to water pump sealing surface. While sealer is wet, install water pump and tighten attaching bolts.

3) Install all accessories, drive belts and connect battery cable.

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

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Engine	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke		Displ.	
				in.	mm	in.	mm	cu. ins.	cc
2.2L (135")	84@4800	111@2800	8.5:1	3.44	87.5	3.62	92.0	135	2200

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
2.2L (135")	2.362-2.363 (59.987-60.013)	.0003-.0031 (.007-.080)	No. 3	.002-.0007 (.05-.18)	1.968-1.969 (49.987-50.005)	.0008-.0034 (.019-.087)	.005-.013 (.13-.32)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit① In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
2.2L (135")	.0005-.0015 (.013-.038)	.0002-.00075 (.006-.019)	.0007-.0017 (.018-.043)	1	.011-.021 (.28-.53)	.0015-.003 (.038-.078)
				2	.011-.021 (.28-.53)	.0015-.004 (.038-.093)
				3	.015-.055 (.38-1.40)	....

① – Interference Fit.

2.2 LITER 4-CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

VALVES

Engine & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width② In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift③ In. (mm)
2.2L (135″)							
Int.①	1.60 (40.64)	45°	45°	.069-.088 (1.75-2.25)	.3124 (7.935)	.0009-.0026 (.022-.065)	.429 (10.89)
Exh.①	1.39 (35.4)	45°	45°	.059-.078 (1.50-2.00)	.3103 (7.881)	.0028-.0044 (.070-.113)	.430 (10.92)

① — Valve length is 4.425″ (112.20 mm).
② — Minimum valve margin is .030-.050″ (.79-1.20 mm).
③ — Measured on 1.6:1 rocker arm ratio.

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
2.2L (135″)	2.28 (57.90)	99-108@1.65 (45-49@41.91)	168-182@1.22 (76-83@30.99)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)
Cylinder Head Bolt①	②45 (61)
Main Bearing Cap Bolt	②30 (41)
Connecting Rod Cap Nut	②40 (54)
Crankshaft Sprocket Bolt	50 (69)
Intermediate Sprocket Bolt	65 (89)
Camshaft Sprocket Bolt	65 (89)
Camshaft Bearing Cap Bolt	14 (19)
Camshaft Cover Bolt	9 (12)
Front Oil Seal Retainer Bolt	9 (12)
Rear Oil Seal Retainer Bolt	9 (12)
Intermediate Retainer Bolt	9 (12)
Intake Manifold Bolt	17 (23)
Exhaust Manifold Nut	17 (23)
Oil Pump-to-Block Bolt	17 (23)
Oil Pump Cover Bolt	9 (12)
Pickup Tube Bolt	21 (28)
Oil Pan Bolt	17 (23)
Water Pump	17 (23)

① — Tightened in 3 steps.
② — Then tighten an additional ¼ turn.