

3.7 LITER 6-CYLINDER

IDENTIFICATION CODING

ENGINE IDENTIFICATION

The 8th digit of Vehicle Identification Number identifies engine cubic inch displacement and carburetor type. The VIN plate is attached to upper left side of instrument panel and is visible through windshield. The Engine Identification Number is stamped on engine block below No. 6 spark plug hole. Cubic inch displacement also appears as second 3 digits of Engine Serial Number, located on a pad below No. 1 spark plug hole.

Engine Identification		
Application	Engine No.	VIN Code
3.7L (225") 1-Bbl.		
Standard	225	E
Heavy Duty	225	F

SPECIAL ENGINE MARKS

Information identifying undersize crankshaft, oversized tappets, low compression, oversized cylinder bores, engine built that day and shift are stamped at various locations on block.

M — (**M-2-3** . .) Indicate .001" (.02 mm) undersize No. 2 & 3 main bearing journals.

R — (**R-1-4** . .) Indicate .001" (.25 mm) undersize No. 1 & 4 connecting rod journals.

M-10 — Indicate .010" (.25 mm) undersize ALL main bearing journals.

R-10 — Indicate .010" (.25 mm) undersize ALL connecting rod journals. These codes are stamped on center crankshaft counterweight.

A — Indicates .020" (.50 mm) oversize cylinder bores. Located top of front pad right side of block.

◆ — Indicates .008" (.20 mm) oversize tappets. Located top of front pad right side of block.

O/S — Indicates .005" (.12 mm) oversize valve stems. Located front of head on thermostat boss.

NOTE — All 225" (3.7L) engines have nodular cast iron crankshafts, and can be identified by letters "CFD" or "AAWJ" cast into them.

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

MANIFOLD ASSEMBLY

Removal — Disconnect all hoses and lines from air cleaner and remove air cleaner. Remove carburetor air heater and disconnect all lines and linkage to carburetor and remove carburetor. Disconnect exhaust pipe at manifold. Remove nuts and washers securing manifold assembly to cylinder head and remove manifold. Remove three screws securing intake manifold to exhaust manifold and separate manifolds.

Installation — 1) Install new gasket between intake and exhaust manifold and install three long screws securing manifold together. Do not tighten at this time. Position manifold assembly on cylinder head using a new gasket.

2) Install triangular washers and nuts on upper studs and four lower studs opposite cylinders No. 2 and 5. These eight triangular washers must be positioned squarely on machined surfaces of both intake and exhaust manifold retaining pads with cup side against manifold.

3) Install steel conical washers with cup side facing manifold, one on upper center stud and two on lower center studs. Install brass washers at each end with flat side against manifold.

NOTE — There must be at least .063" (1.60 mm) clearance at the minimum point between exhaust manifold and the two end brass washers.

4) Install nuts with flat side away from washers, snug all nuts, but do not over-tighten. After tightening 3 intake-to-exhaust manifold screws, tighten manifold nuts in sequence shown in Fig. 1. Reinstall carburetor, hoses, wires, cables, linkage, air cleaner, and exhaust pipe.

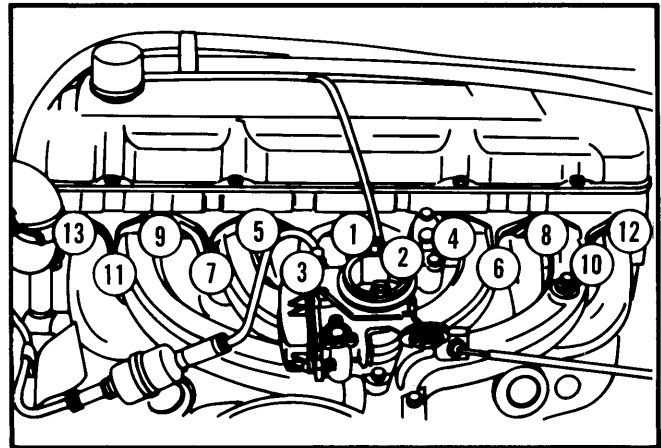


Fig. 1 Manifold Assembly Tightening Sequence

CYLINDER HEAD

Removal — Drain cooling system and disconnect necessary wires, hoses and linkage. Disconnect exhaust pipe at manifold flange. Remove rocker cover, rocker arms and shaft assembly. Remove push rods and identify to insure installation in original locations. Remove cylinder head bolts, cylinder head, intake and exhaust manifold as an assembly.

NOTE — Separation of intake and exhaust manifolds from cylinder head is not necessary, unless head is to be serviced and/or replaced.

CAUTION — Be sure that gasket surfaces of cylinder block and head are free of any dirt, grease, oil, or foreign material(s).

Installation — After positioning gasket on cylinder block, install head, head bolts, and tighten bolts to specification using proper sequence shown in Fig. 2. Install rocker arm, shaft assembly, and tighten bolts to specification. Connect all wires, hoses, cables, and linkage previously removed and reverse removal procedures.

3.7 LITER 6-CYLINDER (Cont.)

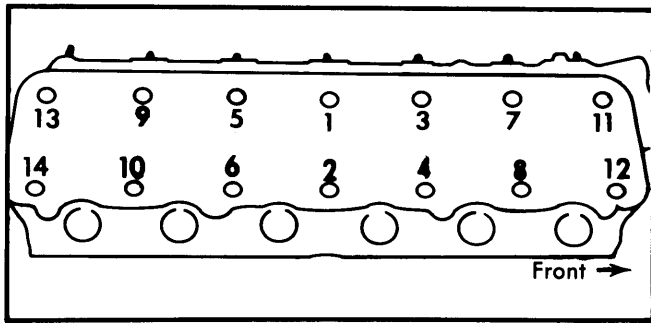


Fig. 2 Cylinder Head Tightening Sequence

VALVES

VALVE ARRANGEMENT

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

VALVE GUIDE SERVICING

Wear Check — Remove valve springs and install sleeve tool (C-3973) over valve stem and install valve. Attach dial indicator to cylinder head and set it at right angle to valve stem being measured. Total sideplay should not exceed .017" (.43 mm). If dial reading is excessive or stems are scuffed or scored, ream guides for installation of valves with oversize stems.

Servicing — Ream guides to next oversize valve stem. Oversize valve stems are available in .005" (.12 mm), .015" (.38 mm) and .030" (.76 mm) sizes.

NOTE — Do not attempt to ream guides from standard diameter to .030" (.76 mm) oversize in one step. Use step procedures to obtain the .030" (.76 mm).

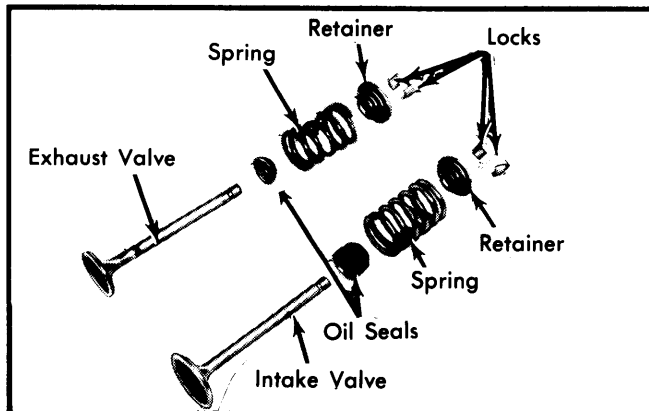


Fig. 3 Exploded View of Valve Assemblies

VALVE STEM OIL SEALS

NOTE — All valves use cup type oil seals. Intake valves use long seals and exhaust valves use shorts seals.

Removal & Installation — Remove valve springs and valve stem seals. Coat valve stems with engine oil and press new seals over valve stem squarely onto valve guide. Leave .06" (1.5 mm) gap between top of guide and seal.

VALVE SPRINGS

Removal — With cylinder head removed, compress valve springs using suitable tool (C-3422A). Remove valve retaining locks, retainers and valve springs.

Installation — Reverse removal procedure and only compress spring enough to install the locks. Check valve spring height.

VALVE SPRING INSTALLED HEIGHT

Valve spring must be square within .063" (1.60 mm). Installed height of spring (measured from spring contact area on head to underside of spring retainer) should not exceed 1.67" (42.4 mm). If height is greater than maximum allowable, install .063" (1.60 mm) spacer(s) to bring height back to normal 1.62-1.68" (41.1-43.0 mm).

ROCKER ARM ASSEMBLY

See Fig. 4 for assembly of parts, noting the following: Assembly must be installed with oil hole upward and toward front of engine. Be sure that shaft retainers are seated on rocker arm shaft and not on extended bushing or rocker arm. Install long retainer at center position and special shaft bolt at rear of engine.

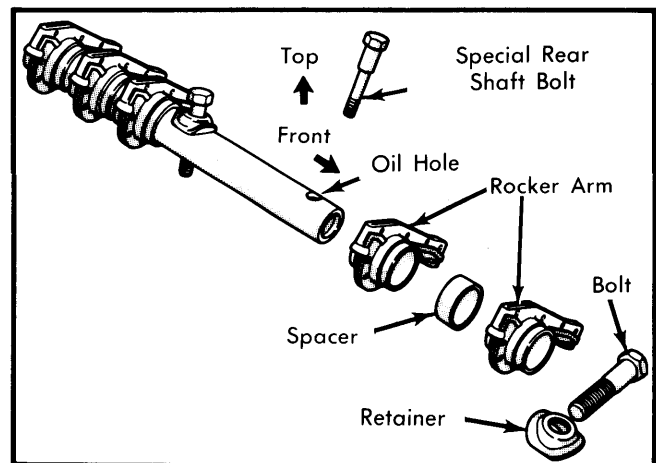


Fig. 4 Partially Disassembled View of Rocker Arm Shaft Assembly

HYDRAULIC VALVE LIFTER ASSEMBLY

NOTE — Lifters are serviced as complete assemblies only. Parts are not interchangeable between lifters. If any component of lifter is worn or damaged, complete lifter must be replaced.

To test, remove cap from plunger. Fill plunger body with clean kerosene and install plunger. Unseat check ball and replace cap. Place lifter upright in suitable lifter testing tool (C-4343) and check leakdown. If lifter collapses immediately, disassemble, clean and retest. If rapid leakdown still occurs, replace lifter.

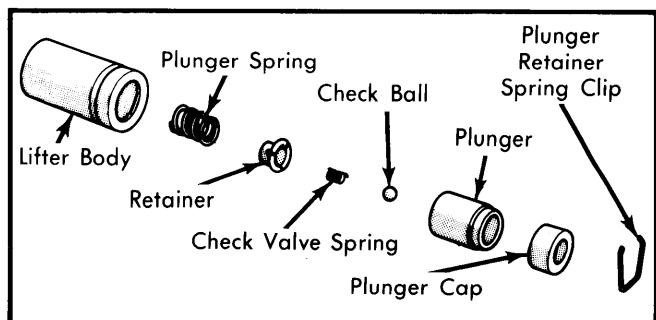


Fig. 5 Exploded View of Hydraulic Lifter Assembly

3.7 LITER 6-CYLINDER (Cont.)

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 a suitable ridge reamer (C-3012) to remove any ridge or deposits on upper end of cylinder bore.

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

2) Inspect connecting rods and caps for cylinder identification and mark as necessary. Remove rod cap and push piston and rod assembly out top of cylinder block. Use care not to nick crankshaft journal or cylinder wall. Install rod caps on mating rods.

Installation — 1) Compression ring gaps must be located on piston so they will be on left side of engine and staggered about 60° apart.

NOTE — *Be sure the mark "TOP" on each compression ring is facing upward toward top of piston and that ring gap does not line up with oil ring rail gap.*

2) Rotate oil ring expander so gaps are at right side of engine and rotate steel rails so gaps are opposite (positioned above piston pin holes).

3) Lightly coat cylinder bores, pistons and rings with engine oil, slide suitable ring compressor (C-385) over piston and tighten. Install each piston and rod assembly (notch on piston head and oil hole in rod facing front of engine) in its respective bore and guide connecting rod onto crankshaft journal. Tap piston head with hammer handle to seat connecting rod against crankshaft. Install rod caps, nuts and tighten.

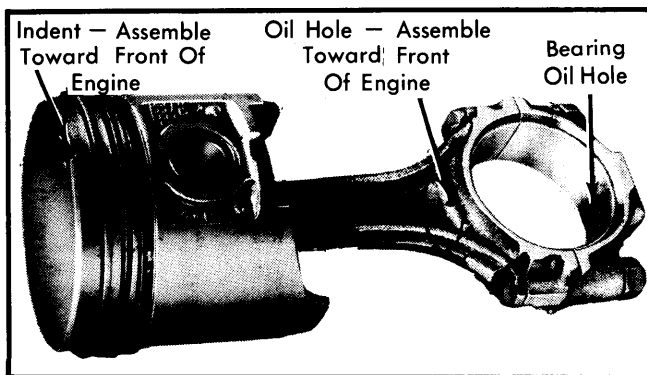


Fig. 6 Assembling Piston-to-Connecting Rod

FITTING PISTONS

With pistons and cylinder bores dry and clean, measure for piston-to-cylinder wall clearance. Clearance should be .0005-.0015" (.012-.038 mm). Measurements should be taken at room temperature. Measure piston diameter at top of skirt 90° to piston axis. Measure cylinder bore halfway down cylinder and 90° to crankshaft center line.

PISTON PINS

Removal — Use tool layout shown in Fig. 7 to press piston pin from bore.

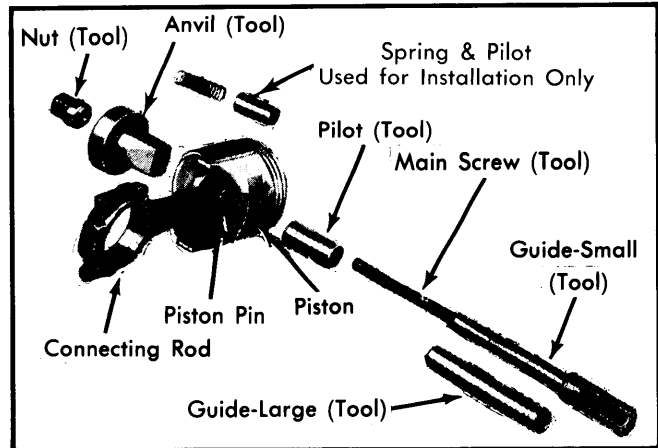


Fig. 7 Tool Arrangement for Piston Pin Removal and Installation

Installation — Lubricate pin bore and use suitable tool (C-3724) and arbor press to install piston pin while noting following: Position piston head and connecting rod with notch and oil hole UP so oil hole will face front of engine upon installation. Press pin into position until pin bottoms on pilot tool.

CRANKSHAFT & ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

Connecting Rod Bearings — 1) After ensuring rod caps are properly identified for later installation on same rods, remove rod caps. If shim stock method is used, smooth edges of a .50" (12.7 mm) by .75" (19.0 mm) piece of brass shim stock .001" (.02 mm) thick. Oil and place between bearing and connecting rod journal. Install bearing cap and tighten.

2) Rotate crankshaft ¼ turn in each direction. If a slight drag is felt, clearance is within limits. If no drag is felt, clearance is excessive. If crankshaft can not be rotated, clearance is not enough.

3) Using Plastigage method, insert a .001" (.02 mm) to .003" (.07 mm) green piece of Plastigage between bearing and connecting rod journal. Install bearing cap and tighten to specification.

4) Remove bearing cap and compare width of Plastigage with scale on package. If Plastigage width is within specifications, move on to next rod bearing. If it is not, fit rod with correct undersized bearings.

5) New bearings are available in standard .001" (.25 mm), .002" (.05 mm), .003" (.07 mm), .010" (.25 mm) and .012" (.30 mm) undersize. Always install bearings in pairs. Do not use a new bearing with an old bearing. Install connecting rod bearings so formed tang fits into machined groove in connecting rod. Install rod caps and tighten nuts.

Main Bearings — 1) Using either Shim Stock method or Plastigage method, check main bearing clearance one at a time while all other main bearing caps are tight. New bearings are available in standard .001" (.02 mm), .002" (.05 mm), .003" (.07 mm), .010" (.25 mm) and .012" (.30 mm) undersize.

3.7 LITER 6-CYLINDER (Cont.)

A new .001" (.02 mm) bearing half may be used in combination with a new standard bearing half or a .002" (.05 mm) with a .001" (.02 mm) bearing.

NOTE — Always use smaller diameter bearing half as upper bearing.

2) If bearing clearances are not within limits, remove bearing cap, insert suitable tool (C-3509) in oil hole journal and rotate crankshaft clockwise to remove upper bearing half. To install new upper bearing, lightly chamfer sharp edges from plain side and start bearing in place.

3) Insert tool and slowly rotate crankshaft counterclockwise, sliding bearing in place. With new bearing installed, remove tool and install bearing cap and tighten to specification.

NOTE — Upper main bearings are grooved and lower are plain and are not interchangeable. Fit only one bearing at a time, while all other bearing caps are properly tightened.

4) Check crankshaft end play and if it is not within the correct specifications, change number three main bearing. This bearing carries thrust load. Recheck crankshaft end play.

REAR MAIN BEARING OIL SEAL

New split type rubber seals may be replaced without removing the crankshaft. New type seals must be installed as a pair and cannot be used or combined with old type rope seals.

Removal — Remove oil pan, rear seal retainer and rear main bearing cap. Remove lower seal by carefully prying from side with a small screwdriver. Remove upper seal by pressing end of seal with small screwdriver, being careful not to mar crankshaft.

Installation — 1) Oil upper seal lip lightly with engine oil. Hold seal (with paint stripe to rear) tightly against crankshaft with your thumb. Rotate crankshaft while sliding seal into groove.

CAUTION — Sharp edge of groove in block may shave or nick back of the seal. Use care not to damage the sealing lip.

2) Install lower half of seal into lower seal retainer with paint stripe to rear. Install main bearing cap and tighten. Install lower seal retainer and tighten.

NOTE — Do not use sealer or cement on crankshaft seal ends of lip.

CAMSHAFT**ENGINE FRONT COVER**

Removal — Drain cooling system and remove radiator and fan. Use suitable puller (C-3732A) and remove vibration damper. Loosen oil pan bolts to provide clearance between pan and lower flange of cover. Remove cover bolts and cover.

Installation — Check that mating surfaces of chain case cover and cylinder block are clean and free from burrs. Install cover with new gasket and tighten bolts. Tighten oil pan bolts with gaskets in place. Install vibration damper, radiator and fan. Fill cooling system.

FRONT COVER OIL SEAL

Removal — Disconnect battery, drain cooling system and remove radiator and fan assembly. Remove power steering crankshaft pulley and vibration damper. Use a suitable tool to

pry behind lip of oil seal, being careful not to damage crankshaft seal surface of cover.

Installation — Install new seal by installing the threaded shaft part of tool (C-4251) into threads of crankshaft. Place seal into opening with seal spring towards the inside of engine. Place installing adapter (C-4251-2) with the thrust bearing and nut on the shaft. Tighten nut until tool is flush with the timing chain cover. Reverse removal procedure.

TIMING CHAIN

Checking For Stretch — Place scale next to timing chain. Place torque wrench with socket over camshaft sprocket lock bolt and apply torque in direction of crankshaft rotation to take up slack. Torque should be 30 ft. lbs. (41 N·m) with head installed or 15 ft. lbs. (20 N·m) as you apply torque in reverse direction. Measure amount of chain movement and replace timing chain if in excess of .125" (3.17 mm) movement.

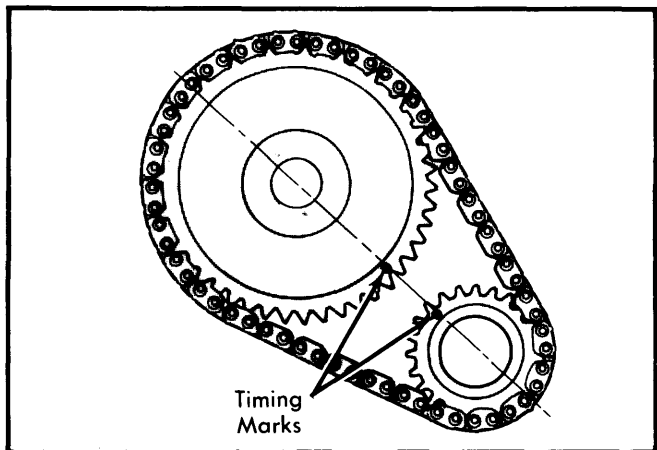


Fig. 8 Timing Chain and Crankshaft Sprocket Alignment

Removal & Installation — Remove camshaft sprocket attaching bolt and remove timing chain with camshaft sprocket. Turn crankshaft to line up centerline of camshaft and crankshaft with the timing mark on crankshaft sprocket. Install camshaft sprocket and timing chain. Line up timing marks on sprockets with centerline of crankshaft and camshaft. Tighten camshaft sprocket bolt.

CAMSHAFT

Removal — Remove lifters, using suitable tool (C-4129). Keep in order for later installation in original locations. Remove timing chain sprockets, distributor, oil pump and fuel pump. Install a long bolt in front end of camshaft to facilitate careful removal. Remove camshaft, being careful not to damage cam bearings with cam lobes.

Installation — If camshaft is being replaced, check tappet faces for "dished" wear and replace if necessary. Lubricate camshaft lobes and bearing journals. Carefully install camshaft in cylinder block. Install all components removed prior to camshaft removal.

CAMSHAFT BEARINGS

Removal — With camshaft removed, drive out rear cam bearing welch plug. Install proper size adaptors and horseshoe washers (C-3132A) at the back of each bearing and drive out all bearings.

3.7 LITER 6-CYLINDER (Cont.)

Installation — 1) Install new bearings using suitable tool (C-3132A) to slide new bearing over the proper adaptor. Position bearing on tool. Install horseshoe lock and drive the bearing into place.

NOTE — Camshaft bearing oil hole or holes must be in exact alignment with drilled oil passages from main bearings.

2) Install No. 1 camshaft bearing .094" (2.38 mm) inward from front face of cylinder block. Apply sealer to new cam plug and install at rear of camshaft. Be sure this plug does not leak.

VALVE TIMING

1) Turn crankshaft until No. 6 exhaust valve is closing and No. 6 intake is opening.

2) Insert .250" (6.35 mm) spacer between arm pad and stem tip of No. 1 intake valve. Allow spring load to bleed tappet down. Install dial indicator so plunger contacts valve spring retainer as nearly perpendicular as possible. Zero indicator.

3) Rotate crankshaft clockwise until valve has lifted .010" (.25 mm). Timing mark should read from 12° before top dead center to 0° before top dead center. Remove spacer.

4) If front pulley marks are not within limits, inspect sprocket index marks, timing chain for wear or check accuracy of TDC mark on front pulley.

ENGINE OILING

Crankcase Capacity — 5 quarts. Add 1 quart with filter change.

Oil Filter — Replace every second oil change. Follow installation directions printed on case of new filter.

Normal Oil Pressure — 30-70 psi (2-5 kg/cm²) @2000 RPM.

Pressure Regulator Valve — In oil pump body. Not adjustable.

ENGINE OILING SYSTEM

Refer to Fig. 10 and note the following:

Rocker Arms & Valves — Transverse channel in rear camshaft journal feeds oil from rear camshaft bearing up along right rear cylinder head bolt and into the rocker shaft at rear attaching bolt. Oil then passes through rocker arm and down hollow push rod to lifter.

Crankshaft Bearings — All main bearings are lubricated as shown in Fig. 10. Connecting rod bearings are lubricated by holes drilled in crankshaft between main and rod journals.

OIL PUMP

Disassembly — Remove pump cover and seal ring. Press off drive gear while supporting gear to eliminate load on aluminum body of pump. Remove outer rotor and inner rotor with shaft. Remove oil pressure relief valve plug, spring and valve.

Inspection — Clean and inspect all parts for damage. Measure all clearances indicated in Oil Pump Specifications table and replace as follows:

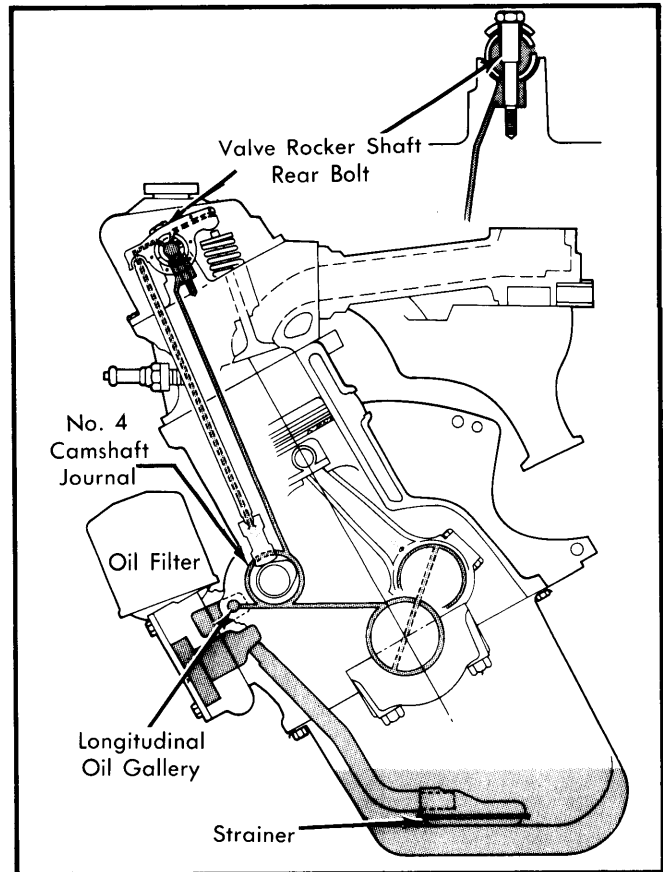


Fig. 9 Diagram of Engine Oiling Circuit

1) Replace entire pump assembly if pump cover wear, clearance over rotors or outer rotor-to-pump body clearance are not within specifications.

2) Replace both rotor assemblies if tip clearance between rotors, rotor thickness or rotor diameter are not within specifications.

3) Oil pressure relief valve must be free from scoring and operate freely in bore of pump body. Spring should have a free length of 2.25" (57.1 mm) and test between 22.3-23.3 lbs. (99-103 N) when compressed to 1.59" (40.3 mm). Replace spring if it does not meet specifications.

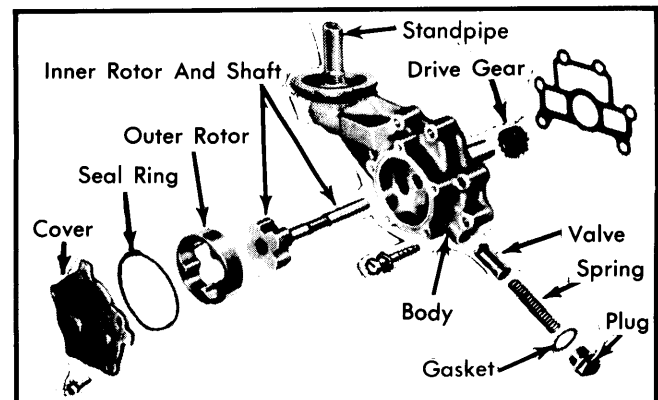


Fig. 10 Exploded View of Oil Pump Assembly

Chrysler Corp. 6 Engines

3.7 LITER 6-CYLINDER (Cont.)

CAUTION — Outer rotor must be installed with large chamfer inward into pump body.

Reassembly & Installation — Assemble pump in reverse order of disassembly using new parts as necessary. Prime oil pump before installation by filling rotor cavity with engine oil. Install pump on engine.

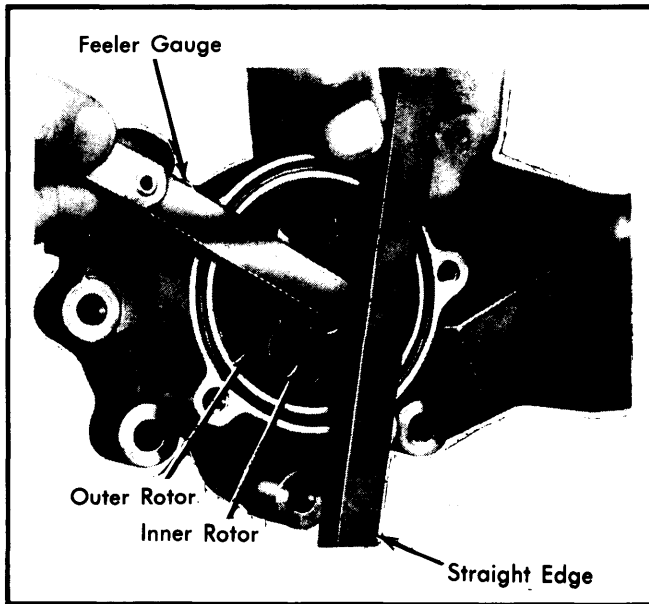


Fig. 11 Making Rotor Clearance Measurement with Feeler Gauge and Straightedge

Oil Pump Specifications

Application	Clearance In. (mm)
Pump Cover Wear0015 (.038)
Inner & Outer Rotor Thickness825 (20)
Outer Rotor Diameter	2.469 (62.7)
Clearance Over Rotors004 (.10)
Outer Rotor-to-Pump Body Clearance010 (.25)
Tip Clearance Between Rotors010 (.25)

ENGINE COOLING

WATER PUMP

Removal — 1) Disconnect negative battery terminal, and drain cooling system. Disconnect upper and lower hoses at radiator. Loosen alternator, air pump and power steering belts. Remove fan, fan assembly and fan shroud. Remove air pump pulley to provide access to mounting screws.

2) Remove air pump and air pump bracket. Remove retaining bolts to power steering pump bracket, and lay power steering pump aside. Disconnect heater hoses and by-pass hose at water pump. Remove water pump retaining bolts and remove water pump.

NOTE — After removing fan assembly, place fan clutch on a bench with flange side facing upward. This will prevent silicone fluid from draining into fan drive bearing and ruining lubricant.

Installation — Clean all sealing surfaces. 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.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS							
Engine	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
				in.	mm	in.	mm
3.7L (225")	85@3600	165@1600	8.4:1	3.40	86	4.12	10

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)
3.7L (225")	1.615-1.625 (41.02-41.27)	45°	45°	.070-.090 (.12-.28)	.372-.373 (.944-9.47)	.001-.003 (.02-.07)	.378 (9.60)
Exhaust	1.355-1.365 (34.41-34.67)	43°	45°	.040-.060 (1.01-1.52)	.371-.372 (9.42-9.44)	.002-.004 (.05-.10)	378 (9.60)

Chrysler Corp. 6 Engines

3.7 LITER 6-CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

VALVE SPRINGS			
Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
3.7L (225")	1.92 (48.7)	49-57@26.0 (3-4@42)	137-150@25.7 (9.6-10.5@33)

VALVE TIMING				
Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
3.7L (225")	6°	42°	36°	12°

PISTONS, PINS, RINGS						
Engine	PISTONS Clearance In. (mm)	PINS		RINGS		
		Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
3.7L (225")	.0005-.0015 (.012-.038)	.00035-.00085 (.0008-.0215)	.0007-.0017 (.017-.043)	1	.010-.020 (.02-.50)	.0015-.004 (.038-.10)
				2	.010-.020 (.02-.50)	.0015-.004 (.038-.10)
				3	.015-.055 (.38-1.39)	.0002-.005 (.005-.127)

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)
3.7L (225")	2.7495-2.7505 (69.837-69.862)	.0010-.0025 (.025-.063)	No. 3	.0035-.0095 (.088-.241)	2.1865-2.1875 (55.53-55.56)	.0010-.0025 (.002-006)	.007-.013 (.17-.33)

CAMSHAFT			
Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
3.7L (225")	No. 1	.001-.003 (.02-.07)
	No. 2	
	No. 3	
	No. 4	

TIGHTENING SPECIFICATIONS	
Application	Ft. Lbs. (N·m)
Cylinder Head	70 (95)
Manifold-to-Cylinder Head	10 (14)
Intake-to-Exhaust Manifold	① 17 (23)
Oil Pan	17 (23)
Main Bearing Cap	85 (157)
Rear Main Bearing Seal Retainer	30 (41)
Connecting Rod Cap	45 (61)
Camshaft Sprocket	50 (68)
Rocker Shaft Support Bracket	24 (33)
Engine Front Cover	17 (23)
Oil Pump Attaching Bolt	17 (23)
Water Pump	30 (41)
Oil Filter Stud	10 (14)
Front Mount-to-Frame	75 (102)
Front Mount-to-Engine	65 (88)
Application	INCH Lbs. (N·m)
Rocker Arm Cover	36 (3.9)
Oil Pump Cover	96 (10.5)
① - Tighten .375" (9.52 mm) bolt to 20 ft. lbs. (27 N·m).	