

5.2 & 5.9 LITER V8

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engine identification number is stamped on a pad located to rear of right engine mount. First 2 positions indicate year and manufacturing plant code. Next 3 digits are cubic inch displacement. Next 4 digits are build date, and last four digits are engine sequence numbers.

ENGINE IDENTIFICATION CODES

Engine	Code
5.2L (318")	318
5.9L (360")	360

SPECIAL ENGINE MARKS

Information identifying undersize and oversize components will be found at various engine locations. It is decoded as follows:

- "M" or "R" followed by number, indicates which main or rod bearing journal is .001" (.03 mm) undersize. This mark will be stamped on No. 8 crankshaft counterweight on 5.2L engines and on No. 3 crankshaft counterweight on 5.9L engines.
- "MX" or "RX" indicates all main or rod bearing journals are .010" (.25 mm) undersize. Marked on No. 8 crankshaft counterweight (5.2L), or No. 3 crankshaft counterweight (5.9L).
- "A" indicates .020" (.51 mm) oversize cylinder bores. Follows engine identification number.
- "♦" indicates .008" (.20 mm) oversize lifters. Located on top pad, front of engine, and stamped on flat ground on outside surface of each oversize lifter bore.
- "X" indicates .005" (.13 mm) oversize valve stems. Found on milled pad next to two 3/8" tapped holes on each end of cylinder head.

ENGINE REMOVAL

See "Engine Removal" at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

INTAKE MANIFOLD

Removal

1) Drain cooling system and disconnect battery ground cable. Remove alternator, air cleaner, fuel line and PCV system. Disconnect accelerator linkage, coil wires, by-pass hose and heater hoses, and temperature indicator sending wire.

2) Remove distributor cap and wires, and vacuum hose between carburetor and distributor. Remove evaporation control system and rocker covers. Remove intake manifold, coil and carburetor as an assembly.

Installation

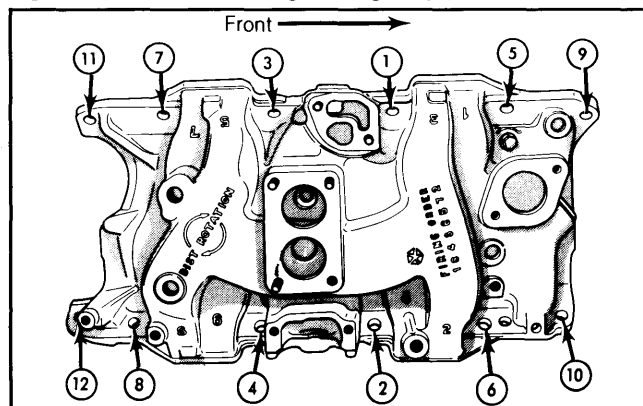
1) Clean all gasket mating surfaces. Lightly coat intake manifold side gaskets with gasket sealer (5.2L 2-Bbl only), and install gaskets on cylinder head. Note that 5.2L 4-Bbl and 5.9L engines DO NOT use any sealer on side composition gaskets.

2) Coat front and rear intake manifold gaskets and cylinder block with a quick-dry cement. Allow to dry and install gaskets, ensuring end holes in gaskets are locked into tangs of head gasket. Place a 1/4" (6 mm)

diameter bead of silicone sealer at each of the 4 intake manifold-to-cylinder head gasket corners.

3) Position intake manifold on engine. Inspect gaskets for correct positioning, and install attaching bolts finger tight. Tighten in 3 steps. See Fig. 1.

Fig. 1: Intake Manifold Tightening Sequence.



Tighten all bolts to 25 ft. lbs. (34 N.m). Then, tighten bolts 1 through 4 to 40 ft. lbs. (54 N.m), and bolts 5 through 12 to 45 ft. lbs. (61 N.m).

CYLINDER HEAD

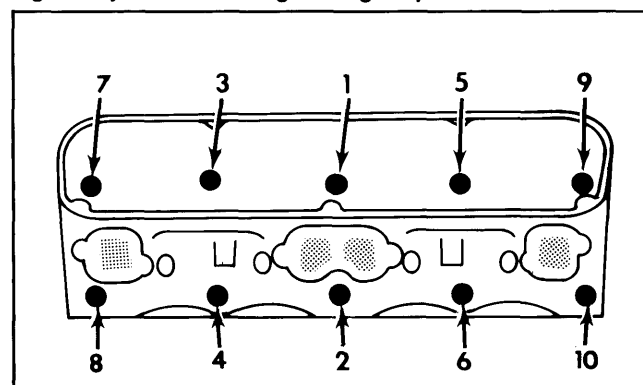
Removal

Drain cooling system and disconnect battery ground cable. Remove intake and exhaust manifolds. Remove rocker arm shaft assemblies. Identify push rods for installation in their original locations, and remove. Remove head bolts and cylinder heads from engine.

Installation

Clean all gasket surfaces of cylinder block and head. Coat new head gaskets with head gasket sealer and install on cylinder block. Install cylinder heads. Apply sealer to cylinder head bolts, install, and tighten in 2 steps. See Fig. 2. Reverse removal procedure to complete installation.

Fig. 2: Cylinder Head Tightening Sequence



Tighten all bolts to 50 ft. lbs. (68 N.m); then, to 95 ft. lbs. (129 N.m).

VALVES

VALVE ARRANGEMENT

E-I-I-E-E-I-I-E (both banks, front-to-rear).

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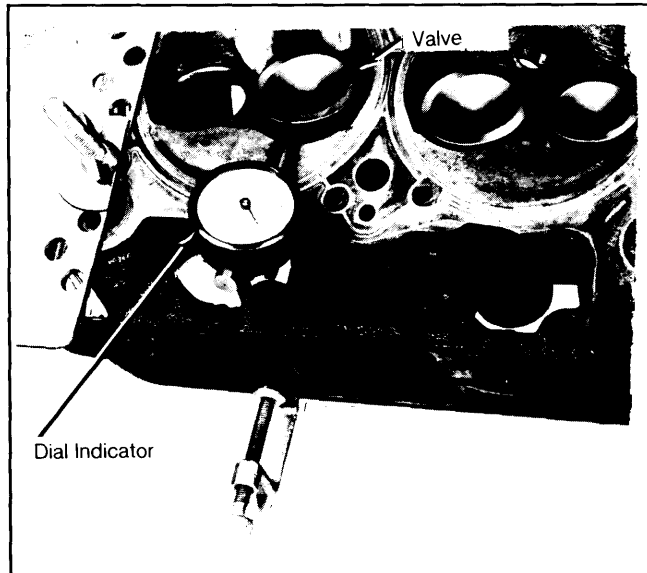
VALVE GUIDE SERVICING

Wear Check

1) With valve spring assembly removed and valve guide cleaned, install sleeve tool (C-3937) over valve stem to place valve at proper height, and install valve in cylinder head.

2) Attach a dial indicator to cylinder head and position indicator at right angle to valve stem being measured. Total side play should not exceed .017" (.43 mm). See Fig. 3.

Fig. 3: Measuring Valve Stem-to-Guide Clearance.



Total side play should not exceed .017" (.43 mm).

Servicing

Ream guides to correct oversize if valve-to-guide clearance is excessive, or if valve stems are scored or scuffed. Oversize valves are available in .005" (.13 mm), .015" (.38 mm) and .030" (.76 mm).

CAUTION: Do not ream guides from standard to .030" (.76 mm) oversize in one step. Use step procedure to obtain .030" (.76 mm).

VALVE STEM OIL SEALS

Cup-type seal is used on all valves. If seals are removed for any reason, new seals must be used upon reassembly.

VALVE SPRINGS

CAUTION: Installing wrong exhaust valve springs on engines with positive rotators can cause severe engine damage.

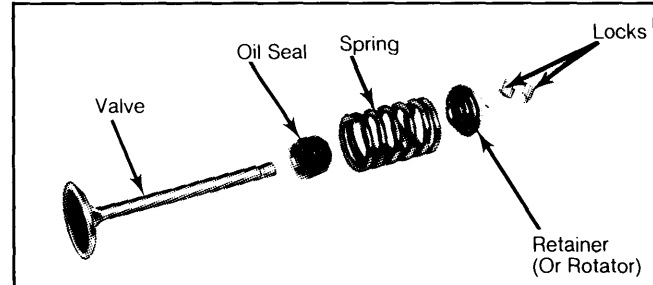
Removal

1) With cylinder head removed, compress valve springs using valve spring compressor. Remove valve retaining locks, valve spring retainers (or rotators), valve springs and valve stem cup seals. Before removing valves, remove any burrs from valve stem lock grooves to prevent damage to valve guides.

2) Identify valves to ensure installation in original locations. Note that all intake valve springs are

blue; 5.2L exhaust valve springs with rotators are white, and 5.9L exhaust valve springs with rotators are yellow. See Fig. 4.

Fig. 4: Exploded View of Valve Assembly



Use proper, color-coded valve springs.

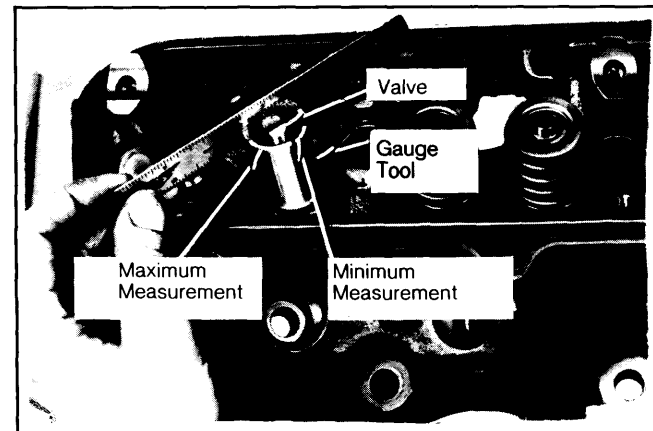
Inspection

Whenever valve springs are removed, they should be checked with valve spring tester. Check each spring for squareness, using a steel square and flat surface. If spring is more than $\frac{3}{64}$ " (2 mm) out-of-square, install new spring.

Installation

1) Lubricate valve stems and install valves in cylinder head. If valves or seats have been reground, check valve stem height using gauge tool (C-3968). If valve is too long, grind tip of valve stem until length is within limits. See Fig. 5.

Fig. 5: Measuring Valve Stem Length



Grind tip of valve stem for desired length.

2) Install new oil seals. Install exhaust valve oil seals, down against valve guides. Position intake oil seals firmly and squarely over valve guides, but do not force seal against top of guide. Using spring compressor, install valve springs, retainers (or rotators) and locks.

VALVE SPRING INSTALLED HEIGHT

1) If valves and/or seats are reground, measure installed height of springs. Measurement is taken from bottom of spring seat in cylinder head (or from top of spacer) to bottom surface of spring retainer (or rotator).

2) If installed height is not $1\frac{1}{8}$ "- $1\frac{1}{16}$ " (41.27-42.86 mm), install a $\frac{1}{16}$ " (1.7 mm) spacer in head counterbore to correct spring height. Exhaust valve springs with positive rotators should have a length of $1\frac{29}{64}$ "- $1\frac{33}{64}$ " (36.9-38.5 mm) with valves closed.

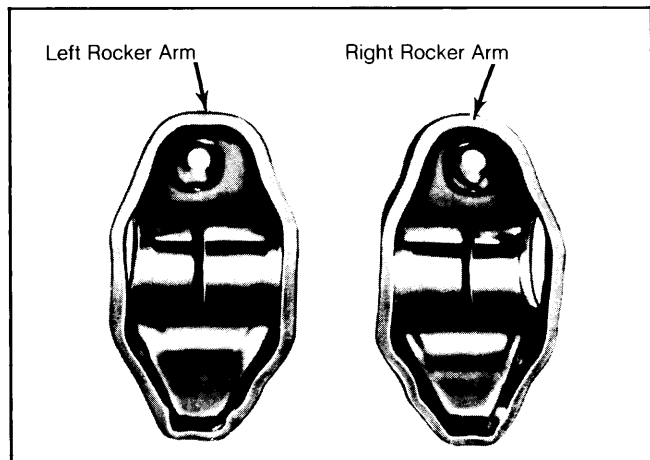
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CAUTION: Do not shim to a height less than specifications.

ROCKER ARM ASSEMBLY

1) Rocker arms are stamped steel type. They are mounted on a shaft, attached to cylinder head at five support brackets, which are cast into cylinder head. Exhaust rocker arms are designed to allow clearance for rotators. Rocker arms have right and left positions. See Fig. 6.

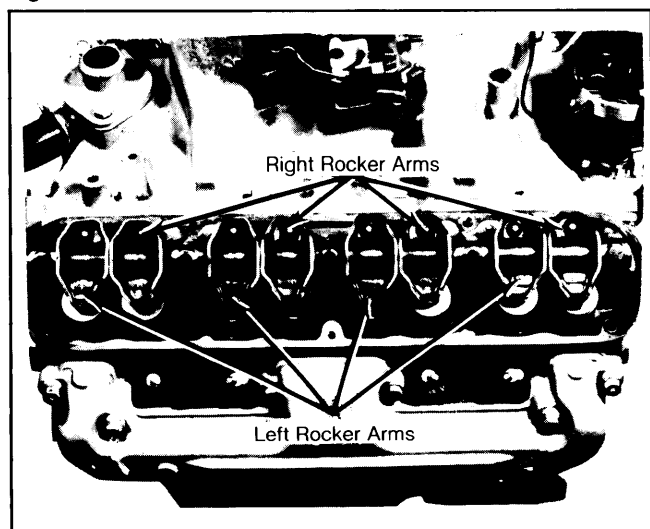
Fig. 6: Identifying Rocker Arms



Right and left rocker arms differ.

2) If rocker arm assemblies are disassembled, reassemble rocker arms on shaft as shown in Fig. 7. Notch on end of rocker arm shaft must point to centerline of engine and toward front of engine on left bank, and to rear of engine on right bank. Install long retainers 1 position in, from ends of rocker arm shaft.

Fig. 7: Location of Rocker Arms.



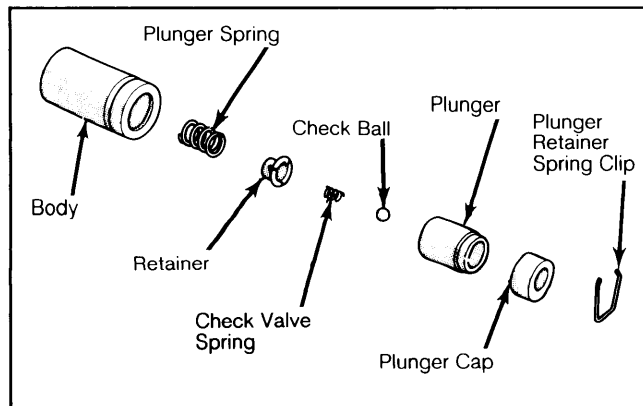
Install long retainers 1 position in, from ends of shaft.

HYDRAULIC VALVE LIFTER ASSEMBLY

NOTE: Lifters are serviced as complete assemblies only.

1) Prior to testing, lifters must be cleaned inside and out to remove varnish and carbon deposits, then reassembled. To test, remove cap from plunger and plunger from lifter body. See Fig. 8. Fill lifter body with clean kerosene. Unseat check valve (or ball). Install plunger and cap.

Fig. 8: Hydraulic Lifter Assembly



Parts are not interchangeable between lifters.

2) Place lifter upright in Lifter Testing Tool (C-4343) and check leakdown by compressing tool. If lifter collapses immediately, disassemble, clean and retest. If rapid leakdown still occurs, replace lifter. Replace lifter if it shows a "dished" wear condition.

3) If lifter or lifter bore in cylinder block is scuffed, scored, or shows signs of sticking, ream bore to next oversize and replace with oversize lifter.

PISTONS, PINS & RINGS

OIL PAN

See "Oil Pan Removal" at end of ENGINE Section.

PISTON & ROD ASSEMBLY

Removal

1) Remove cylinder head and oil pan. Place piston at bottom of stroke and cover top of piston to collect cuttings. Remove ridge at top of cylinder bore using ridge reamer.

2) Inspect connecting rods and caps for cylinder identification and mark as necessary. Remove rod cap and cover exposed cap bolts with rubber hose to protect crankshaft. Carefully push piston out top of cylinder bore and install rod caps on mating rods.

Installation

1) Compression ring gaps must be staggered so neither is in line with oil ring rail gaps, and "TOP" mark must be facing top of piston. Oil ring expander ends should be butted under notch (front) of piston. Oil ring rail gaps should be facing middle of engine upon installation, and spread 3" apart. See Fig. 9.

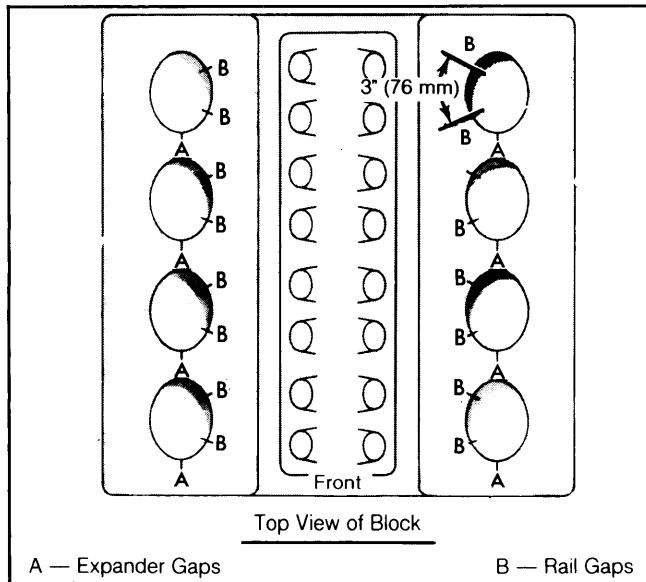
2) Immerse piston head and rings in clean engine oil and slide ring compressor over piston, and tighten. Do not allow position of rings to change.

3) Be sure connecting rod bolts are covered, to protect cylinder bore and crankshaft journal surfaces from being damaged during piston installation.

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Fig. 9: Positioning Oil Rings for Installation.



Do not allow ring positions to change during installation.

4) Rotate crankshaft so connecting rod journal is in center of cylinder bore. Position piston in cylinder bore. Notch on piston head must be facing front of engine, and larger connecting rod chamfer must face crankshaft fillet.

5) Tap piston into cylinder bore using hammer handle. Guide connecting rod into place on crankshaft journal. Install rod cap, and tighten.

FITTING PISTONS

NOTE: Make all measurements at room temperature (70°F, 21°C).

1) Check cylinder bore for taper or out-of-round, using a micrometer. Maximum allowable cylinder bore taper is .010" (.25 mm), and out-of-round must not exceed .005" (.13 mm). Excessive taper and out-of-round, or scuffed or scored cylinder walls, require reboring and honing for installation of new pistons and rings.

2) If cylinders are honed, wash thoroughly with scrub brush and soapy water, then rinse well. Oil bores after cleaning to prevent rust. Piston assemblies are available in standard and .020" (.51 mm) oversize.

3) With piston and cylinder bores dry and clean, measure piston diameter at top of skirt, 90° to piston pin axis. Measure cylinder bore halfway down cylinder and 90° to crankshaft centerline. Measure for piston-to-cylinder wall clearance.

4) Measure ring end gap in cylinder bore with feeler gauge. Ring must be square in bore, about 2" (50.8 mm) from bottom of bore.

5) With ring lands clean, measure ring side clearance between ring and ring land with feeler gauge. Oil ring rails should be free in groove.

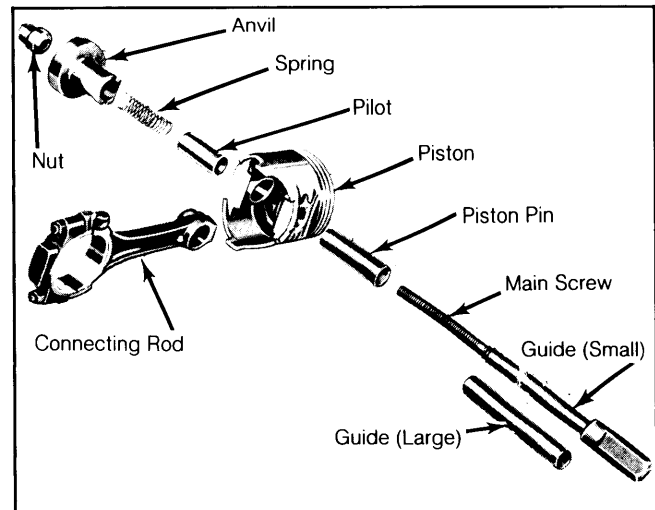
PISTON PINS

Removal

Use piston pin removal tool (C-4158) for pin removal, using proper pilots and anvils. Install pilot on main screw, and install screw through piston pin. Install

anvil (with spring removed) over threaded end of main screw, with small end of anvil against piston boss. Install nut loosely on main screw, and press piston pin out. See Fig. 10.

Fig. 10: Tools for Piston Pin Removal & Installation



Spring is used during installation only.

Installation

1) Test piston pin fit in piston. Pin should be a sliding fit in piston at room temperature (70°F, 21°C). Piston pins are available in standard, .003" (.08 mm) and .008" (.20 mm) oversize.

2) Arrange piston pin tool for installation of piston pin. Install spring inside pilot, and install spring and pilot in anvil. Lubricate piston pin bores and connecting rod pin bore. Install piston pin over main screw.

3) Place piston (with notch up) and connecting rod over pilot, so pilot extends through piston pin bores. Assemble rods to pistons of the right cylinder bank (2, 4, 6 and 8) with indent on piston head opposite to larger chamfer on large bore end of connecting rod.

4) Assemble rods to pistons of the left cylinder bank (1, 3, 5 and 7) with indent on piston head on the same side as the large chamfer on large bore end of connecting rod.

5) Install main screw and piston pin in piston, and install nut on main screw to hold assembly together. Press piston pin in, until piston pin bottoms on the pilot.

Checking Pin Fit

Assemble piston pin tool as for piston pin removal. Secure butt end of main screw in vise. Attach a torque wrench to nut, and test torque to 15 ft. lbs. (20 N.m). If connecting rod moves downward on piston pin, replace connecting rod and retest.

CRANKSHAFT & ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

NOTE: Plastigage method is used for checking bearing clearances. The following procedures are with oil pan and oil pump removed, and oil film removed from surfaces to be checked.

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Connecting Rod Bearings

1) After ensuring rod caps are marked for cylinder identification, remove rod caps. Turn crankshaft until connecting rod to be checked starts moving toward the top of the engine.

2) Place Plastigage across width of bearing shell in cap, approximately $\frac{1}{4}$ " (6 mm) off center and away from oil holes. Tighten bearing cap to 45 ft. lbs. (61 N.m). Do not rotate crankshaft.

3) Remove bearing cap, and compare width of flattened Plastigage with inch scale on package. Difference in readings between the ends indicates amount of taper present. Compare readings with specifications.

4) New bearings are available in standard, .001" (.03 mm), .002" (.05 mm), .003" (.08 mm), .010" (.25 mm) and .012" (.31 mm) undersize. Always install bearings in pairs. Do not use a new bearing with an old bearing.

5) Install connecting rod bearings so formed tang fits into machined groove in connecting rod. Install rod caps, with "V" groove of bearing matching "V" groove of cap, and tighten nuts.

Main Bearings

1) Check main bearing clearances, 1 at a time. The total clearance of the main bearings can only be determined by removing the weight of the crankshaft. Place a .010" (.25 mm) minimum thickness cardboard shim between the bearing shell and cap of the bearings adjacent to the bearing being checked. Tighten adjacent bearing caps to 10-15 ft. lbs. (14-20 N.m).

2) Measure clearance, using Plastigage method explained under Connecting Rod Bearings. Tighten main bearing cap bolts to 85 ft. lbs. (115 N.m).

3) New bearings are available in standard, .001" (.03 mm), .002" (.05 mm), .003" (.08 mm), .010" (.25 mm) and .012" (.31 mm) undersize. Never use an old bearing with a new bearing.

4) Fit main bearings 1 at a time. Remove bearing cap, and insert pin tool (C-3509) into crankshaft oil hole. Rotate crankshaft clockwise to remove upper bearing.

5) To install new upper bearing, slightly chamfer sharp edges from plain side, and start bearing in place. Insert pin tool, and slowly rotate crankshaft counterclockwise, sliding bearing into place. Install main bearing cap with new bearing, and tighten.

NOTE: Upper main bearings are grooved and lower main bearings are plain. Upper and lower bearings are not interchangeable.

6) Check crankshaft end play. If not within specifications, replace No. 3 main bearing. This flanged bearing carries the thrust load.

REAR MAIN BEARING OIL SEAL

Split-type rubber seals may be installed without removing crankshaft. Rubber seals must be installed as pairs, and cannot be used with rope type seals.

Removal

With oil pan and oil pump removed, remove rear main bearing cap. Remove upper seal by pressing on end of seal with small screwdriver. Remove lower seal by pushing on end with small screwdriver.

Installation

1) On 5.2L engines, insert cap seals into slots in bearing cap. Seal with yellow paint goes in right side of

cap, with cap in engine position. Make sure seals are installed with narrow sealing edges up.

2) Also make sure that edges of cap seals line up exactly with shoulder in bearing cap, to prevent oil leakage. Install seal edge toward inside of shoulder, and pull outward on small end of seal until edge lines up with shoulder.

3) On all models, lightly oil seal lips. With crankshaft surface clean and lightly oiled, rotate upper seal half into block with paint stripe to rear. Exercise care not to cut or shave seal outer surface.

4) Place lower seal in bearing cap with paint stripe to rear. On 5.9L engines, apply sealer on cap surface next to rear main seal ends, install cap immediately and tighten.

CAMSHAFT

ENGINE FRONT COVER

Removal

1) Disconnect battery. Drain cooling system and remove radiator and water pump assembly. Remove power steering pump (if equipped). Remove crankshaft pulley and vibration damper.

2) Remove fuel lines and fuel pump. Loosen oil pan bolts and remove front bolts at each side. Remove front cover and gasket, using care not to damage oil pan gasket.

Installation

1) Check that mating surfaces of cover and cylinder block are clean and free from burrs. Apply a $\frac{1}{8}$ " (3 mm) bead of silicone sealer to oil pan gasket. Apply Lubriplate to front cover oil seal lip, and install cover and attaching bolts. DO NOT tighten bolts at this time.

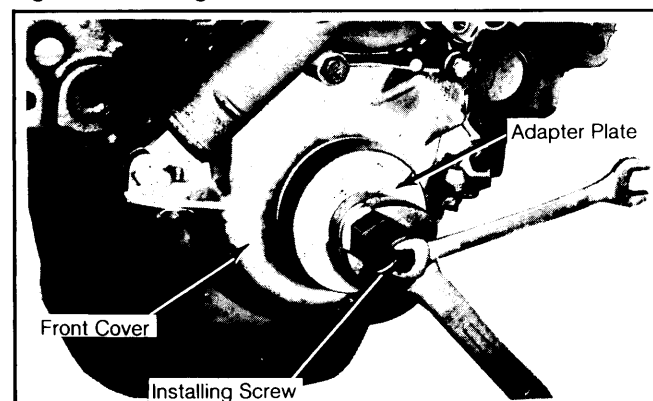
2) Install vibration damper onto crankshaft to align oil seal, and tighten damper bolt. Tighten front cover bolts, then oil pan bolts. Reverse removal procedure to complete installation.

FRONT COVER OIL SEAL

Removal

Disconnect battery. Remove belts from crankshaft pulley and remove fan and shroud from engine. Remove crankshaft pulley and vibration damper. Pry seal outward from behind lip, being careful not to damage crankshaft seal surface of front cover.

Fig. 11: Installing Front Cover Seal



Tighten nut until tool is flush with cover.

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Installation

1) Install new seal by using seal installing tool (C-4251 or equivalent). Install threaded shaft part of tool into threads of crankshaft. Place seal into opening, with spring toward inside of engine.

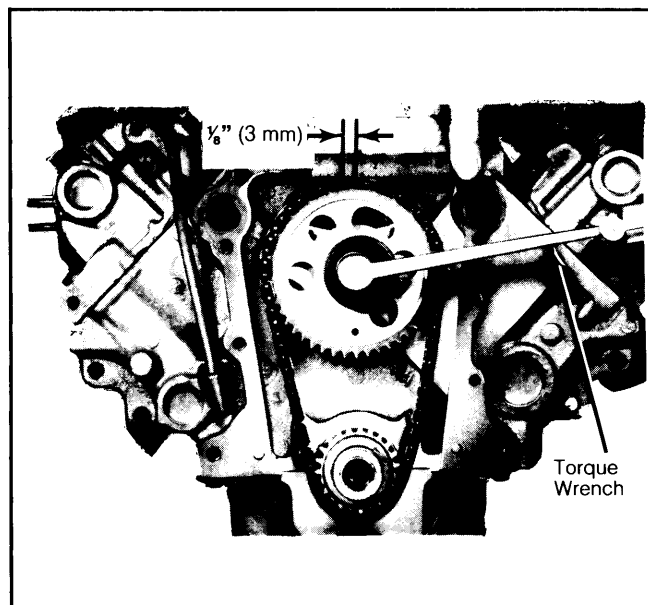
2) Place adapter with thrust bearing and nut on shaft. Tighten nut until tool is flush with cover. Reinstall vibration damper, crankshaft pulley, fan, shroud, and belts. Reconnect battery. See Fig. 11.

TIMING CHAIN

Checking for Stretch

1) Position scale next to timing chain to measure any movement of chain. See Fig. 12. Place torque wrench with socket over camshaft sprocket lock bolt. Apply torque in direction of crankshaft rotation to remove slack. Do not permit crankshaft to turn. Torque should be 30 ft. lbs. (41 N.m) with cylinder heads installed, and 15 ft. lbs. (21 N.m) with cylinder heads removed.

Fig. 12: Measuring Timing Chain Stretch



Torque is 30 ft. lbs. (41 N.m) with heads installed; 15 ft. lbs. (20 N.m) with heads removed.

2) Apply same torque in reverse direction, and measure amount of chain movement. If movement exceeds $\frac{1}{8}$ " (3 mm), install new timing chain.

Removal

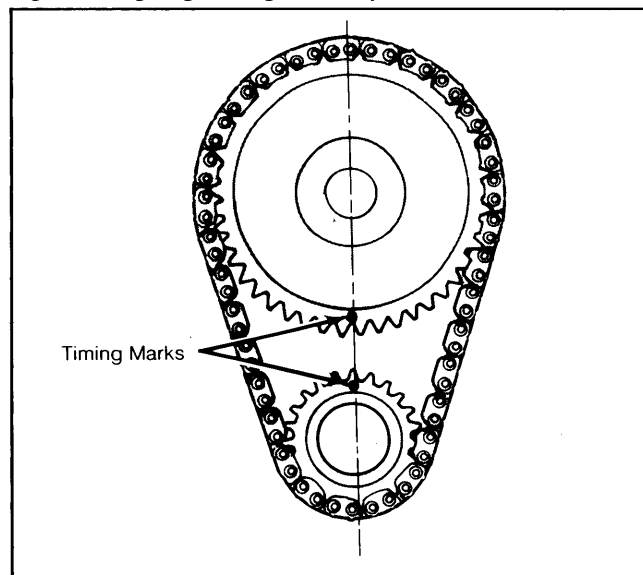
With front cover removed, remove camshaft sprocket attaching bolt, washer and fuel pump eccentric. Remove timing chain with crankshaft and camshaft sprockets.

Installation

1) Place camshaft and crankshaft sprockets on bench with timing marks on an imaginary centerline through bore of both sprockets. See Fig. 13. Place timing chain around both sprockets. Turn crankshaft and camshaft to line up with keyway locations in sprockets.

2) With chain placed on sprockets, slide both sprockets evenly over their respective shafts. Use a straightedge to measure alignment of timing marks. Install fuel pump eccentric, cup washer and camshaft bolt. Tighten bolt and check camshaft end thrust.

Fig. 13: Aligning Timing Chain Sprocket Marks



Align chain and sprockets on bench prior to installation.

CAMSHAFT

NOTE: Whenever a new camshaft is installed, install new valve lifters.

Removal

1) With engine removed from vehicle, remove intake manifold, front cover and timing chain. Remove rocker arm and shaft assemblies. Identify push rods and valve lifters for reinstallation in original locations, and remove. Replace any lifter that exhibits a "dished" wear condition.

2) Remove distributor and lift out distributor/oil pump drive shaft. Remove camshaft thrust plate, noting location of oil tab. Install a long bolt into front of camshaft to facilitate removal, and remove camshaft using care not to damage camshaft bearings.

Fig. 14: Exploded View of Camshaft Assembly



Ensure top edge of chain oil tab is flat against thrust plate.

Installation

1) Lubricate camshaft lobes and bearing journals. Insert camshaft to within 2" (50.8 mm) of its final

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position in block. Install camshaft holding tool (C-3509) in distributor drive hole, and hold in position using distributor retainer plate bolt. This prevents camshaft from contacting and possibly knocking out welch plug in rear of block.

2) Install thrust plate and chain oil tab, ensuring top edge of tab is flat against thrust plate to provide oil for chain lubrication. Install timing chain and sprockets, fuel pump eccentric, cup washer, and camshaft bolt. See Fig. 14.

3) Remove camshaft holding tool. Install camshaft to final position. To complete installation, reverse order of removal.

CAMSHAFT BEARINGS

Removal

With engine completely disassembled, drive out rear cam bearing welch plug. Install proper size adapters and horseshoe washers of bearing installer tool (C-3132A) at rear of each bearing, and drive out bearings.

Installation

1) Slide new rear bearing over proper adapter of bearing installer tool. Install horseshoe lock, and carefully drive bearing into place. Install remaining bearings in same manner.

2) Bearings must be aligned to bring oil holes in line with oil passages from main bearing. The No. 2 bearing must index with oil passage to left cylinder head, and No. 4 bearing must index with oil passage to right cylinder head. Install a new camshaft welch plug at rear of engine. Welch plug must not leak.

CAMSHAFT END THRUST

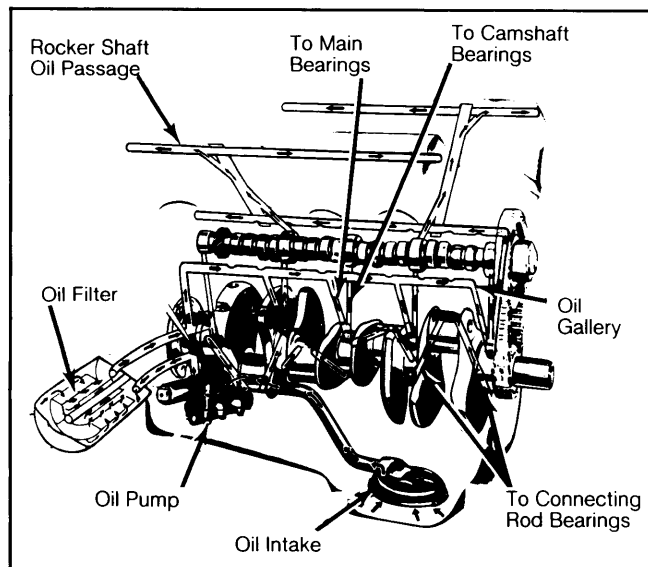
End thrust is taken by thrust plate behind camshaft sprocket. End play should be .002-.010" (.05-.25 mm). If not within specifications, replace thrust plate.

ENGINE OILING

Crankcase Capacity

Capacity of all engines is 5 quarts (4.7L). Add 1 quart (.95L) with each filter change.

Fig. 15: Engine Oiling System



Oil Filter

Change at first oil change and every second oil change thereafter.

Normal Oil Pressure

30-80 psi (2.1-5.6 kg/cm²) at 2000 RPM.

Pressure Regulator Valve

Located in oil pump, not adjustable.

ENGINE OILING SYSTEM

System has a rotor type oil pump and full-flow type oil filter. Oil is forced by pump through a series of oil passages in engine to provide lubrication to engine components.

Oil is supplied to hollow rocker arm shaft (left side) from No. 2 camshaft bearing and to hollow rocker arm shaft (right side) from No. 4 camshaft bearing, through indexed holes in camshaft.

Oil enters rocker arm shaft, through second rocker arm bracket from rear (right side), to lubricate rocker arm assembly. Valve assembly is lubricated by oil spray from drilled holes in rocker arms. See Fig. 15.

OIL PUMP

Removal

Remove oil pan. Remove attaching bolts and oil pump from rear main bearing cap. Ensure oil pump and rear main bearing cap machined surfaces are clean and free from burrs.

Disassembly

Remove pump cover and seal ring. Remove inner rotor and shaft, and lift out outer rotor. Remove cotter pin, oil pressure relief valve plug, spring and valve. See Fig. 16.

Inspection

Clean all parts thoroughly. Replace oil pump if mating surface of pump cover is scratched or grooved. Measure clearances indicated in Oil Pump Specifications table and replace parts as follows:

1) Replace oil pump if pump cover wear or flatness is not within limits, when measured with straight-edge and feeler gauge. Replace inner rotor and shaft if thickness measures too thin.

2) Replace outer rotor if thickness and diameter measure below limits. With outer rotor pressed to side of pump body with finger, measure clearance between surfaces using feeler gauge. If not correct, replace pump.

3) With inner and outer rotor in pump body, measure clearance between rotor tips. Replace shaft and both rotors if clearance is excessive. With straightedge placed across pump body and away from cover bolt holes, use a feeler gauge to measure clearance between rotors and straightedge. Replace oil pump if excessive.

4) Relief valve spring should have free length of 2 $\frac{1}{32}$ -2 $\frac{3}{64}$ " (51.6 to 52.0 mm). Spring should test between 16.2-17.2 lbs. (7.35-7.80 kg) when compressed to 1 $\frac{11}{32}$ " (34.1 mm). Replace spring which fails specifications.

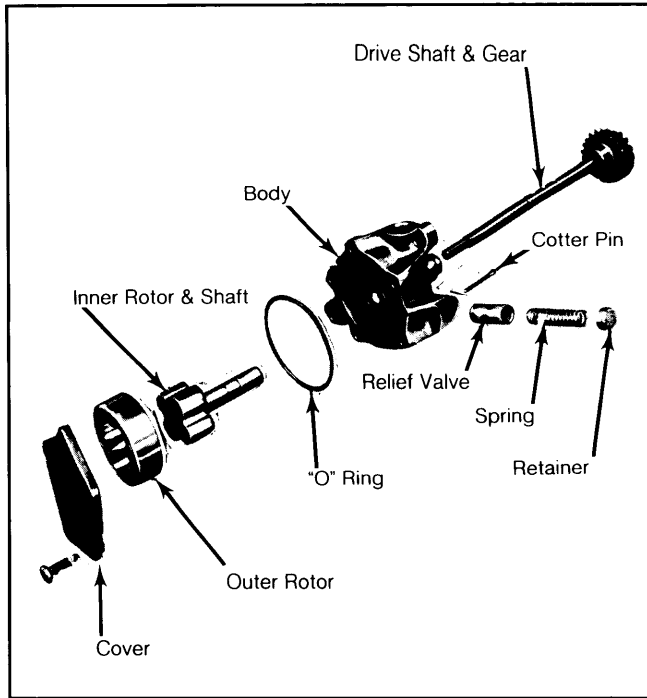
Reassembly

Assemble pump in reverse order of disassembly, using new seal ring and new parts as required. Note that outer rotor must be installed into pump body with large chamfered edge inward. Prime oil pump with engine oil before installing.

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Fig. 16: Oil Pump Assembly



Install outer rotor into pump body with large chamfered edge inward.

OIL PUMP SPECIFICATIONS

Application	Specifications In. (mm)
Pump Cover Wear	.0014 (.035) Max.
Clearance Over Rotors	.003 (.076) Max.
Inner & Outer Rotor Thickness	
5.2L Engine	.826 (20.98) Min.
5.8L Engine	.944 (23.98) Min.
Outer Rotor Diameter	2.47 (62.74) Min.
Outer Rotor-to-Pump Body	.013 (.33) Max.
Rotor Tip Clearance	.009 (.23) Max.

Installation

Install oil pump to rear main bearing cap. Ensure that drive shaft is positioned properly in pump, and that it does not bind. Oil pump and rear main bearing cap surfaces must mate properly to prevent oil leakage.

ENGINE COOLING

WATER PUMP

Removal

1) Drain cooling system. If equipped with A/C, remove radiator. Remove all drive belts. Remove fan, spacer (or fluid unit), pulley and bolts as an assembly.

2) If not equipped with A/C, remove alternator bracket attaching bolts, and position alternator out of way. On A/C models, remove alternator and adjusting bracket and power steering pump. Position components aside.

CAUTION: After removing fluid unit, do not place drive unit with shaft pointing downward. Silicone fluid from fluid unit could drain into fan drive bearing, causing lubricant failure.

3) Remove heater and by-pass hoses. Remove A/C compressor pulley, field coil assembly, and front bracket. Remove water pump.

Installation

Clean all gasket mating surfaces. Install water pump using new gasket. 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" at end of ENGINE Section.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Camshaft Sprocket Bolt	50 (68)
Camshaft Thrust Plate	18 (24)
Front Cover Bolt	35 (47)
Connecting Rod Nut	45 (61)
Crankshaft Damper Bolt	100 (136)
Cylinder Head Bolt	95 (129)
Exhaust Manifold	
Bolt	20 (27)
Nut	15 (20)
Flywheel-to-Crankshaft Bolts	55 (75)
Intake Manifold Bolt	
Step 1	25 (34)
Step 2 (4 inner bolts)	40 (54)
Step 3 (Remaining bolts)	45 (61)
Main Bearing Cap Bolt	85 (115)
Oil Pump Attaching Bolt	30 (41)
Rocker Arm Shaft Retaining Bolt	17 (23)

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displ.		Carburetor	HP at RPM	Torque Ft. Lbs. @ RPM	Compr. Ratio	Bore		Stroke	
	cu. ins.	liters					in.	mm	in.	mm
1982	318	5.2	2-Bbl. & 4-Bbl.	.....	.....	8.6:1	3.91	99.3	3.31	84.1
	360	5.9	2-Bbl. & 4-Bbl.	.....	.....	8.5:1	4.00	101.6	3.58	90.9

Chrysler Corp. V8 Engines

7-23

5.2 & 5.9 LITER V8 (Cont.)

ENGINE SPECIFICATIONS (Cont.)

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)
5.2L Int.	1.780 (45.21)	44½-45°	45-45½°	.065-.085 (1.65-2.16)	.372-.373 (9.45-9.47)	.001-.003 (.02-.08)	.373 (9.47)
Exh.	1.517 (38.53)	44½-45°	45-45½°	.080-.100 (2.03-2.54)	.371-.372 (9.42-9.45)	.002-.004 (.05-.10)	.400 (10.16)
5.9L Int.	1.880 (47.75)	44½-45°	45-45½°	.065-.085 (1.65-2.16)	.372-.373 (9.45-9.47)	.001-.003 (.02-.08)	.410 (10.41)
Exh.	1.617 (41.07)	44½-45°	45-45½°	.080-.100 (2.03-2.54)	.371-.372 (9.42-9.45)	.002-.004 (.05-.10)	.410 (10.41)

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)
5.2L	.0005-.0015 (.013-.038)	.000-.0005 (.000-.038)	.0007-.0014 (.018-.035)	1 & 2 3	.010-.020 (.25-.51) .015-.055 (.38-1.40)	.0015-.0030 (.038-.076) .0002-.005 (.005-.127)
5.9L	.0005-.0015 (.013-.038)	.00025-.00075 (.0064-.0190)	.0007-.0014 (.018-.035)	1 & 2 3	.010-.020 (.25-.51) .015-.055 (.38-1.40)	.0015-.0030 (.038-.076) .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)
5.2L	2.4495-2.5005 (63.487-63.513)	.0005-.0020 (.013-.051)	3	.002-.007 (.05-.18)	2.124-2.125 (53.95-53.98)	.0005-.0022 (.013-.056)	.006-.014 (.15-.36)
5.9L	2.8095-2.8105 (71.361-71.387)	.0005-.0020 (.013-.051)	3	.002-.009 (.05-.23)	2.124-2.125 (53.95-53.98)	.0005-.0022 (.013-.056)	.006-.014 (.15-.36)

CAMSHAFT

Engine	Journal In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
5.2L & 5.9L ¹ No. 1	1.998-1.999 (50.75-50.77)	.001-.003 (.025-.076)	.....
No. 2	1.982-1.983 (50.34-50.37)		
No. 3	1.967-1.968 (49.96-49.99)		
No. 4	1.951-1.952 (49.56-49.58)		
No. 5	1.5605-1.5615 (39.64-39.66)		

¹ — End play is .002-.010" (.05-.15 mm).

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
5.2L Int.	2.00 (50.8)	78-88@1.69 (35-40@42.85)	170-184@1.31 (77-83@33.35)
Exh.	1.81 (46.0)	80-90@1.48 (36-41@37.69)	180-194@1.06 (81-87@27.00)
5.9L Int.	2.00 (50.8)	78-88@1.69 (35-40@42.85)	170-184@1.31 (77-83@33.35)
Exh.	1.81 (46.0)	80-90@1.48 (36-41@37.69)	181-197@1.06 (81-89@27.00)