

# 4.0L 6-CYL - VIN [M] & 4.2L 6-CYL - VIN [C]

1988 Jeep Cherokee

1988 ENGINES  
Chrysler Motors 4.0L & 4.2L 6-Cylinder  
Jeep; Cherokee, Comanche, Wagoneer, Wrangler

## ENGINE CODING

### ENGINE IDENTIFICATION

NOTE: For engine repair procedures not covered in this article, see ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION article in the GENERAL INFORMATION section.

The Vehicle Identification Number (VIN) is located on upper left side of dash and is visible through windshield. The fourth character identifies the engine size. The tenth character identifies the model year.

#### ENGINE IDENTIFICATION CODES TABLE

| Application                 | VIN Code |
|-----------------------------|----------|
| 4.0L 6-Cylinder MPFI .....  | M        |
| 4.2L 6-Cylinder 2-Bbl. .... | C        |

### SPECIAL ENGINE MARKS

Some engines are produced at factory with oversize or undersize components. These engines are identified by a letter code stamped on a boss between ignition coil and distributor. Letters are decoded as follows:

- \* "B" indicates all cylinder bores are .010" (.25 mm) oversize.
- \* "C" indicates all camshaft bearing bores are .010" (.25 mm) oversize.
- \* "M" indicates all main bearing journals are .010" (.25 mm) undersize.
- \* "P" indicates all connecting rod journals are .010" (.25 mm) undersize.

## REMOVAL & INSTALLATION

### ENGINE REMOVAL

See ENGINE REMOVAL in this section.

### INTAKE & EXHAUST MANIFOLD (4.0L)

WARNING: Fuel system is under pressure. Use care when removing fuel lines to prevent personal injury.

Removal

- 1) Disconnect negative battery cable. Remove air inlet from throttle plate assembly. Disconnect throttle, cruise control and throttle valve (A/T models) cables (if equipped).
- 2) Disconnect and mark all vacuum and electrical connectors

from intake manifold. Disconnect fuel lines at fuel rail. Fuel lines are removed by squeezing the 2 retaining tabs against the fuel line and pulling the fuel line from the connector. Use caution as these fuel lines are under pressure.

3) Loosen drive belt tensioner and remove drive belt. Remove power steering pump and bracket from intake manifold. Remove fuel rail retaining bolts. Remove fuel rail and injector assembly.

4) Remove intake manifold heat shield. Disconnect EGR tube fittings. Disconnect exhaust pipe from manifold. Disconnect oxygen sensor. Remove retaining bolts and remove manifolds.

#### Installation

1) Install new gasket. Install exhaust and intake manifolds and loosely install bolts. Install EGR tube between manifolds. Tighten manifold bolts in proper sequence see Fig. 1. Tighten to specifications, see TORQUE SPECIFICATIONS TABLE in this article.

2) Tighten EGR tube bolts. Apply anti-seize to oxygen sensor threads prior to installation. Reverse removal procedures for remaining components. Tighten bolts to specification.

3) Install new "O" rings on fuel line connectors prior to installation. Ensure "CLICK" sound is heard when installing fuel lines. This indicates that fuel lines are properly seated.

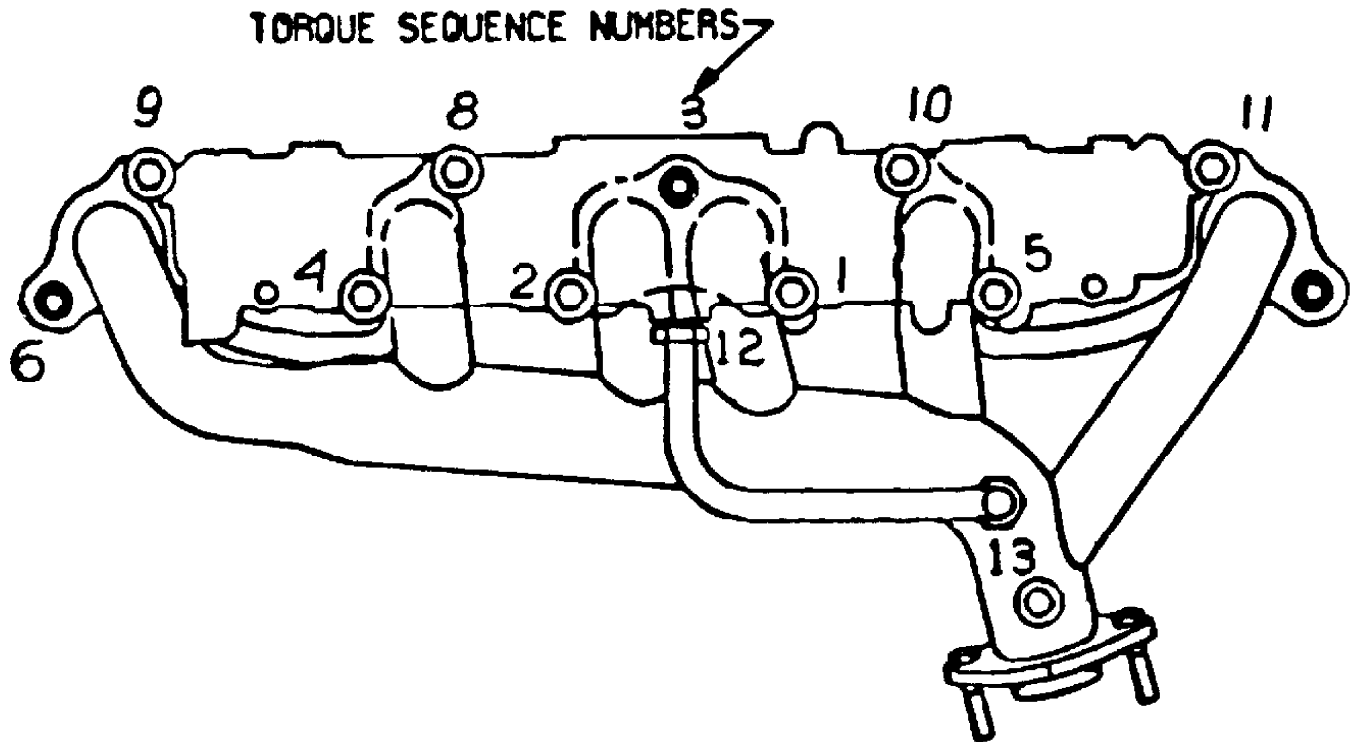


Fig. 1: Manifold Tightening Sequence (4.0L)  
Courtesy of Chrysler Motors.

#### INTAKE & EXHAUST MANIFOLD (4.2L)

##### Removal

1) Remove air cleaner. Disconnect fuel line at carburetor. Mark and disconnect all vacuum hoses, ventilation hoses and electrical connectors at intake manifold.

2) Disconnect throttle cable at bellcrank. On A/T models, disconnect throttle valve rod. On all models, remove PCV hose from manifold. Drain cooling system. Remove coolant hoses from intake

manifold.

3) Remove EGR tube fittings from manifolds. Remove power steering pump and A/C compressor and mounting brackets (if equipped).

4) Remove intake manifold bolts. Remove intake manifold. If exhaust manifold requires removal, disconnect exhaust pipe from manifold. Remove oxygen sensor (if equipped). Remove exhaust manifold.

#### Installation

1) Install new gasket. Install exhaust manifold and loosely install bolts. Install intake manifold. Tighten bolts to specification in proper sequence. See Fig. 2.

2) Apply anti-seize to oxygen sensor threads prior to installation. Reverse removal procedure for remaining components. Tighten bolts to specification. Fill and purge cooling system. See COOLING SYSTEM AIR PURGE under WATER PUMP in this article.

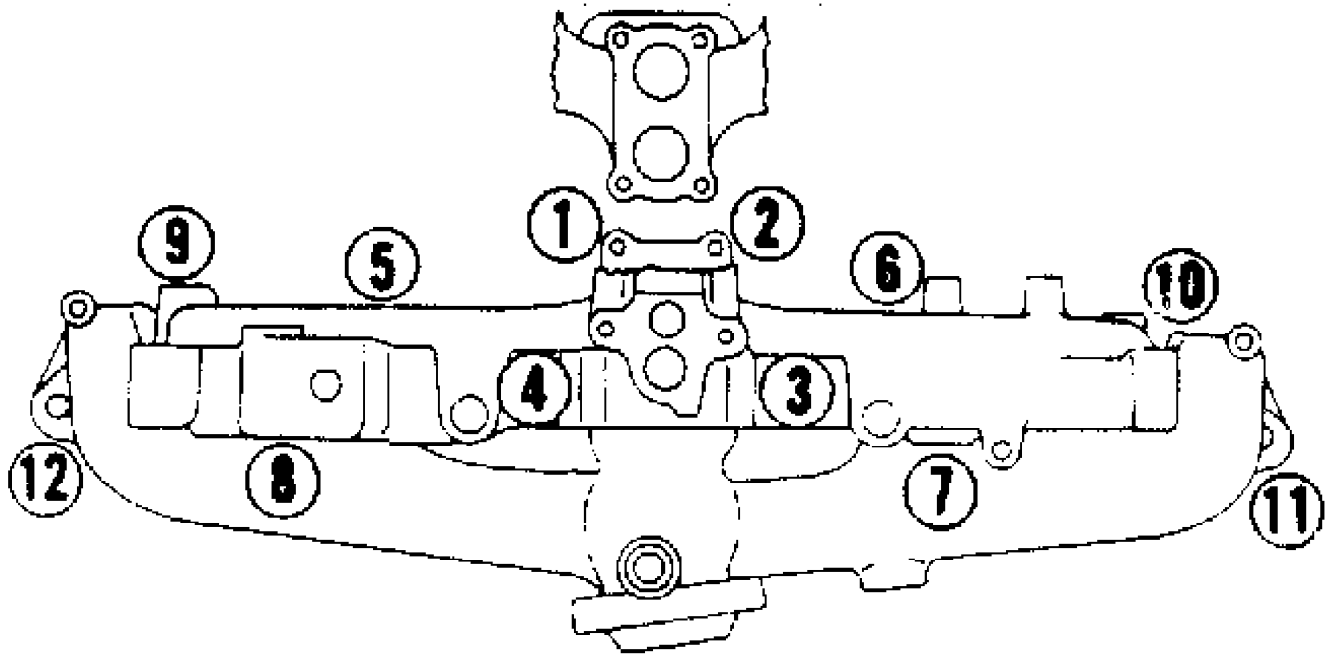


Fig. 2: Manifold Tightening Sequence (4.2L)  
Courtesy of Chrysler Motors.

## CYLINDER HEAD

### Removal

1) Disconnect negative battery cable. Drain cooling system. Disconnect hoses at thermostat housing. Remove intake and exhaust manifolds. See the following:

- \* INTAKE & EXHAUST MANIFOLD (4.0L).
- \* INTAKE & EXHAUST MANIFOLD (4.2L).

2) Disconnect and mark all hoses and electrical connections at cylinder head. Disconnect and mark spark plug wires. Remove spark plugs. Remove valve cover bolts.

3) Remove the rocker arms and the push rods. Remove cylinder head bolts. Remove cylinder head. See ROCKER ARMS & BRIDGE.

### Inspection

Inspect cylinder head for cracks or damage. Using straightedge, check cylinder head for warpage in several areas. Repair

or replace cylinder head if warpage exceeds .002" (.05 mm) per each 6" (152 mm) or damage exists.

#### Installation

1) Ensure all gasket surfaces are clean. Clean carbon from combustion chambers and tops of pistons. Apply sealant to both sides of new cylinder head gasket. Install new gasket with the word "TOP" upward. Ensure all holes are aligned.

2) Install cylinder head. Apply sealing compound to threads of cylinder head bolt No. 11 prior to installation. See Fig. 3. Install head bolts.

3) Tighten all bolts in sequence (except No. 11) to 110 ft. lbs. (149 N.m) on 4.0L or 85 ft. lbs. (115 N.m) on 4.2L models. Tighten No. 11 head bolt to 100 ft. lbs. (136 N.m) on 4.0L or 75 ft. lbs. (136 N.m) on 4.2L. See Fig. 3.

4) Reverse removal procedure for remaining components. Install valve cover and new gasket. Tighten bolts to specification.

5) Refill and purge cooling system. See COOLING SYSTEM AIR PURGE under WATER PUMP in this article.

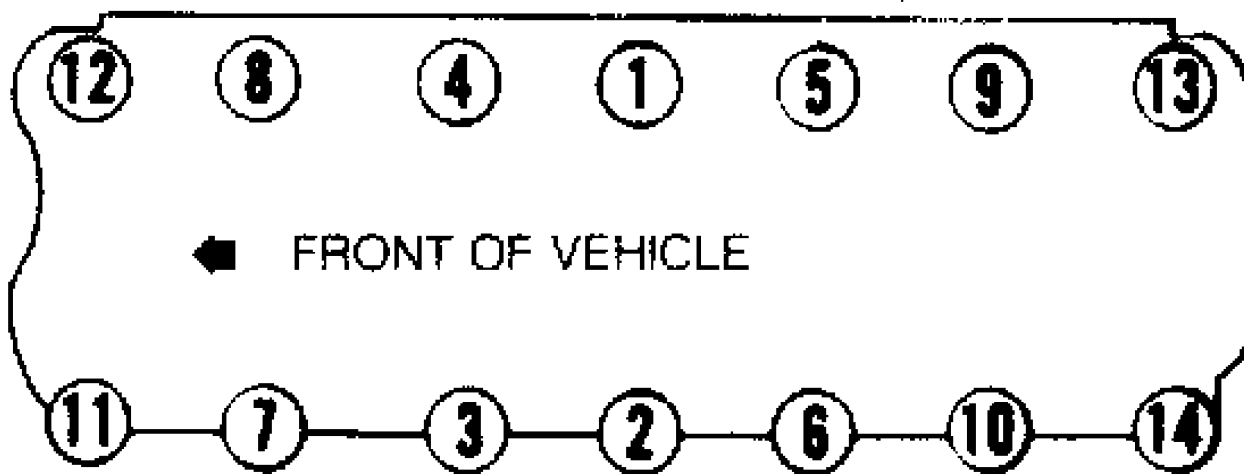


Fig. 3: Cylinder Head Bolt Tightening Sequence  
Courtesy of Chrysler Motors.

#### Valve Arrangement

E-I-I-E-I-E-E-I-E-I-I-E (Front-to-rear).

### ROCKER ARMS & BRIDGE

#### Removal

1) Remove PCV valve hose at valve cover. Remove cruise control servo (if equipped). Remove valve cover. Alternately loosen each rocker arm bolt one turn at a time.

2) Remove rocker arm assemblies and push rods. Mark components for reassembly. Components must be installed in original location.

#### Installation

Reverse removal procedure. Install rocker arm components in original location. Install valve cover and new gasket. Tighten bolts to specification.

#### Valve Guide

Valve guides are not replaceable. If clearance is excessive, valve guides must be reamed to accommodate oversized stem valves.

## VALVE SPRING

Valve springs can be removed without removing cylinder head.

### Valve Spring Installed

For 4.0L the Valve Spring Installed Height Specification is 1.625 inches or 41.29 mm. For the 4.2L the information is not available from manufacturer.

## HYDRAULIC VALVE LIFTER

### Removal

Remove cylinder head. See CYLINDER HEAD. Using Lifter Remover/Installer (J-21884), remove lifter. Mark lifter location for reassembly reference. Replace lifters as an assembly if damaged. Internal components cannot be interchanged.

### Inspection

Inspect lifter and camshaft mating surfaces for wear. Check cylinder block lifter bore diameter. Lifter bore diameter should be within .9055-.9065" (22.999-23.025 mm). Replace parts as necessary.

### Installation

Soak lifter assembly in engine oil prior to installation. Reverse removal procedure for installation. Install lifter in original location.

## ENGINE FRONT COVER

### Removal

1) Disconnect negative battery cable. Remove drive belts, fan and hub assembly. Remove pulley from vibration damper. Remove vibration damper retaining bolt and washer.

2) Using Puller (J-21719-01), remove vibration damper and key. Remove alternator and A/C compressor bracket (if equipped). Remove oil pan-to-front cover bolts. Remove cover-to-block retaining bolts. Remove front cover.

3) Cut oil pan gasket tabs even with face of cylinder block. Remove tabs. Remove gasket from oil pan. Pry crankshaft oil seal from cover.

### Installation

1) Ensure all gasket surfaces are clean. Ensure oil slinger is installed on crankshaft. Apply sealing compound on both sides of front cover gasket. Install gasket on cylinder block. Replace front section of oil pan seal with similar section fabricated from new seal.

2) Coat seal with RTV sealant and place in position. Apply sealant to the joint area of oil pan and cylinder block. Apply engine oil on seal-to-oil pan contact areas.

3) Place front cover on cylinder block. Place Front Cover Seal Installer (J-22248) in front cover seal area. Install all retaining bolts. Tighten bolts to specification.

4) Install front cover oil seal. See FRONT COVER OIL SEAL in this article. Remove front cover seal installer. Reverse removal procedure for remaining components. Lubricate vibration damper retaining bolt with oil prior to installation. Tighten bolts to specification.

## FRONT COVER OIL SEAL

1) Remove vibration damper. Pry seal from front cover. Use

care not to damage seal area. Position new seal on Front Cover Seal Installer (J-22248) with lip facing outward.

2) Apply sealant to seal outer diameter. Lightly coat crankshaft with oil. Place front cover seal installer on front of crankshaft. Tap seal into front cover. Lightly coat seal contact area of vibration damper with oil.

3) Install key in crankshaft (if removed). Install vibration damper. Lubricate vibration damper bolt with oil. Install retaining bolt and washer. Tighten to specification.

## TIMING CHAIN & SPROCKET

### Removal

1) Drain cooling system. Remove radiator. Remove engine front cover. See ENGINE FRONT COVER in this article. Remove oil slinger. Rotate crankshaft until timing marks on sprockets are aligned. See Fig. 4.

2) Remove camshaft sprocket bolt. Remove timing chain and both sprockets as an assembly.

### Installation

Install timing chain and sprockets. Ensure timing marks are aligned. See Fig. 4. Install camshaft sprocket bolt. Tighten bolts to specification. Install new front cover oil seal. Reverse removal procedure for remaining components.

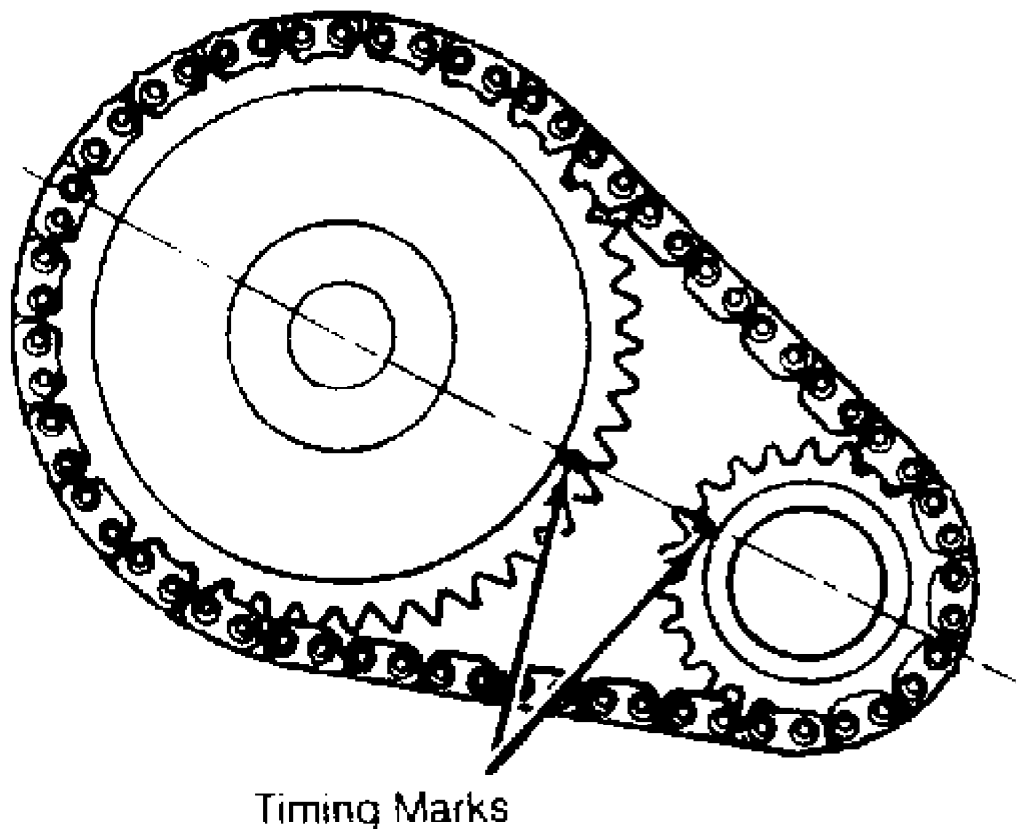


Fig. 4: Timing Chain & Sprocket Alignment  
Courtesy of Chrysler Motors.

## CAMSHAFT

#### Removal

1) Drain cooling system. Remove radiator. Discharge A/C system if necessary. Remove A/C condenser and receiver assembly (if equipped). Remove fuel pump (if equipped with mechanical pump), ignition wires and distributor.

2) Remove cylinder head. See CYLINDER HEAD in this article. Remove hydraulic lifters. Using Lifter Remover/Installer (J-21884), remove lifters. Mark lifter location for reassembly reference.

3) Remove engine front cover. See ENGINE FRONT COVER in this article. Remove timing chain and sprockets. Remove front bumper and grille (if necessary). Carefully remove camshaft.

#### Inspection

Inspect camshaft for flaking, lobe wear or worn bearing journals. Replace if not within specification. See ENGINE SPECIFICATIONS tables.

#### Installation

Lubricate camshaft and install into place. Use care not to damage camshaft bearings. Reverse removal procedure to complete installation. Tighten bolts to specification.

#### Camshaft Bearing

Replace camshaft bearings using camshaft bearing remover/installer. Ensure oil holes are aligned after installation.

### OIL PAN

See OIL PAN REMOVAL at end of ENGINE section.

### PISTON & ROD

NOTE: Mark piston cylinder location for reassembly reference. Install pistons in original cylinder location.

#### Removal

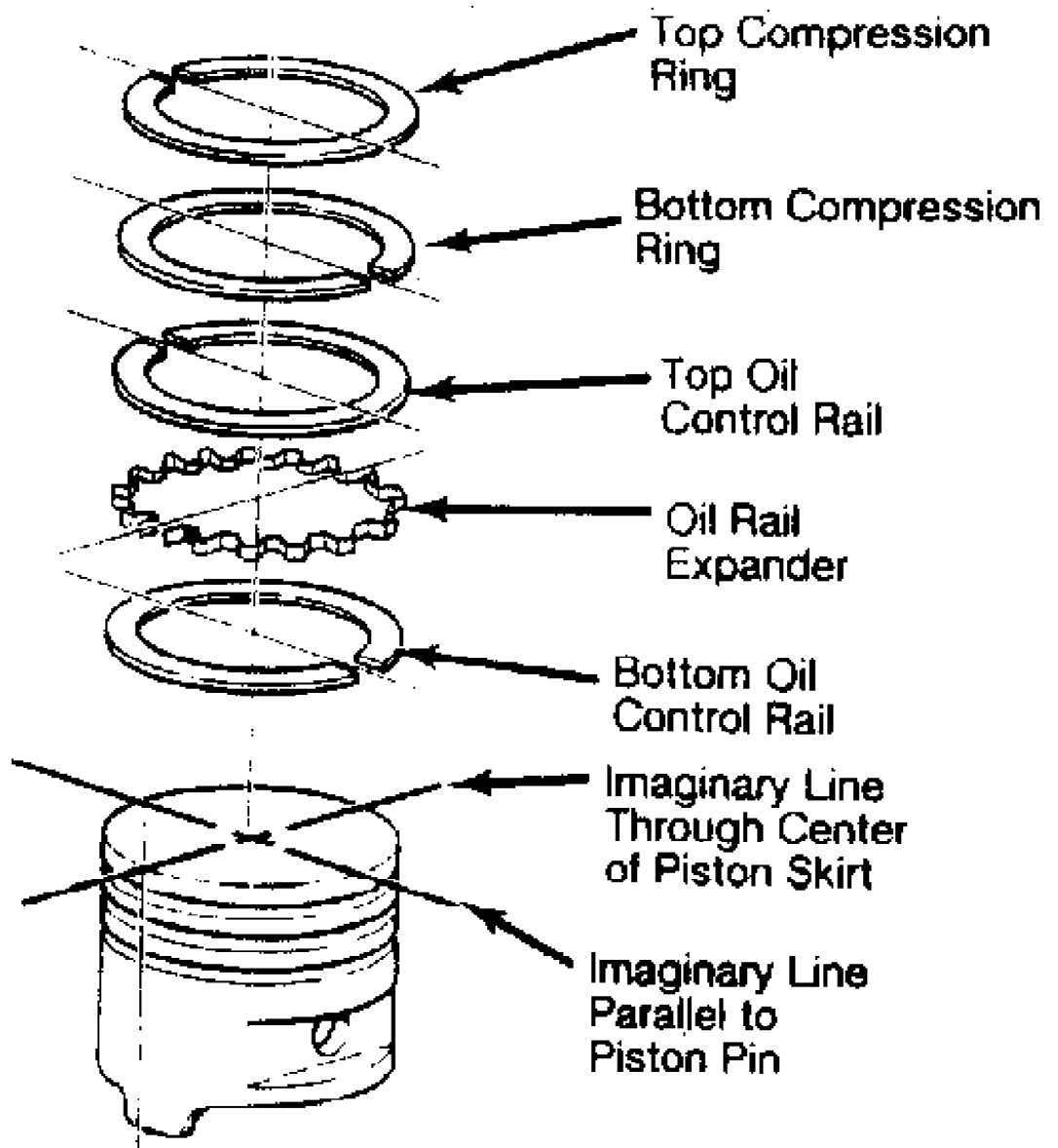
1) Remove cylinder head. See CYLINDER HEAD in this article. Remove oil pan. See OIL PAN REMOVAL at end of ENGINE section. Remove ridge or deposits from cylinder bore.

2) Mark connecting rod and piston for cylinder identification. Remove bearing cap. Remove piston and rod assembly.

CAUTION: Arrows on top of piston must point toward front of engine. Oil squirt holes in connecting rod must face camshaft side of engine.

#### Installation

1) Ensure ring end gap and side clearance are within specification. See ENGINE SPECIFICATIONS tables. Install rings on piston. Position ring end gaps at specified areas. See Fig. 5. Ring gaps may vary 20 degrees from positions illustrated.



### Markings Indicating Top of Ring

Fig. 5: Positioning Piston Ring Gaps  
 Courtesy of Chrysler Motors

2) Lubricate piston assembly and cylinder block. Install piston assembly. Arrows on top of piston must face toward front of engine and connecting rod oil squirt hole should face camshaft side of



engine.

3) Install bearings. Check oil clearance and connecting rod side play clearance. Reverse removal procedure for remaining components. Tighten bolts to specification.

#### Fitting Pistons

1) Determine cylinder taper, wear and out-of-roundness and piston clearance. For cylinder specifications, see CYLINDER, PISTON & ROD SPECIFICATIONS table. If taper or out-of-roundness are not within specification, hone or bore cylinders for installation of new pistons.

2) Measure piston at right angle of the piston pin at the center line of the pin. Compare reading to cylinder bore to determine clearance. Mark fitted piston for cylinder location.

#### CYLINDER, PISTON & ROD SPECIFICATIONS TABLE

| Application                        | In. (mm)                      |
|------------------------------------|-------------------------------|
| Connecting Rod                     |                               |
| Crankshaft Bore .....              | 2.2080-2.2085 (56.083-56.095) |
| Pin Bore .....                     | .9288-.9298 (23.591-23.616)   |
| Cylinder Bore                      |                               |
| Diameter                           |                               |
| 4.0L .....                         | 3.8751-3.8775 (98.427-98.488) |
| 4.2L .....                         | 3.7501-3.7533 (95.252-95.334) |
| Out-of-Round .....                 | .001 (.02)                    |
| Taper .....                        | .001 (.02)                    |
| Piston Pin Bore Diameter .....     | .9308-.9313 (23.642-23.655)   |
| Piston Pin Diameter .....          | .9304-.9309 (23.632-23.644)   |
| Piston-to-Cylinder Clearance ..... | .0009-.0017 (.022-.043)       |

#### PISTON PIN

NOTE: Note direction of arrows on piston and oil squirt hole in connecting rod location prior to removal.

#### Removal

Position piston on Support (J-21872-1), Pin Pilot (J-21872-2) and Driver (J-21872-3) on an arbor press. See Fig. 6. Note location of piston pin through gauge window. Press piston pin from piston.

NOTE: Piston and pin must be at standard room temperature when measuring fit. Piston pin should gravity-fall through the piston at room temperature. Piston pin cannot be reused after removal.

#### Inspection

Measure piston pin diameter, piston bore and connecting rod bores. Replace components if not within specification. See CYLINDER, PISTON & ROD SPECIFICATIONS table.

NOTE: Rod must be positioned on the piston so the oil squirt hole faces the camshaft side of the engine when piston is installed with arrow toward the front of the engine.

#### Installation

1) Insert pin pilot through piston and connecting rod. Place assembly on support. Insert piston pin through the upper piston pin bore and into connecting rod pin bore. See Fig. 6.

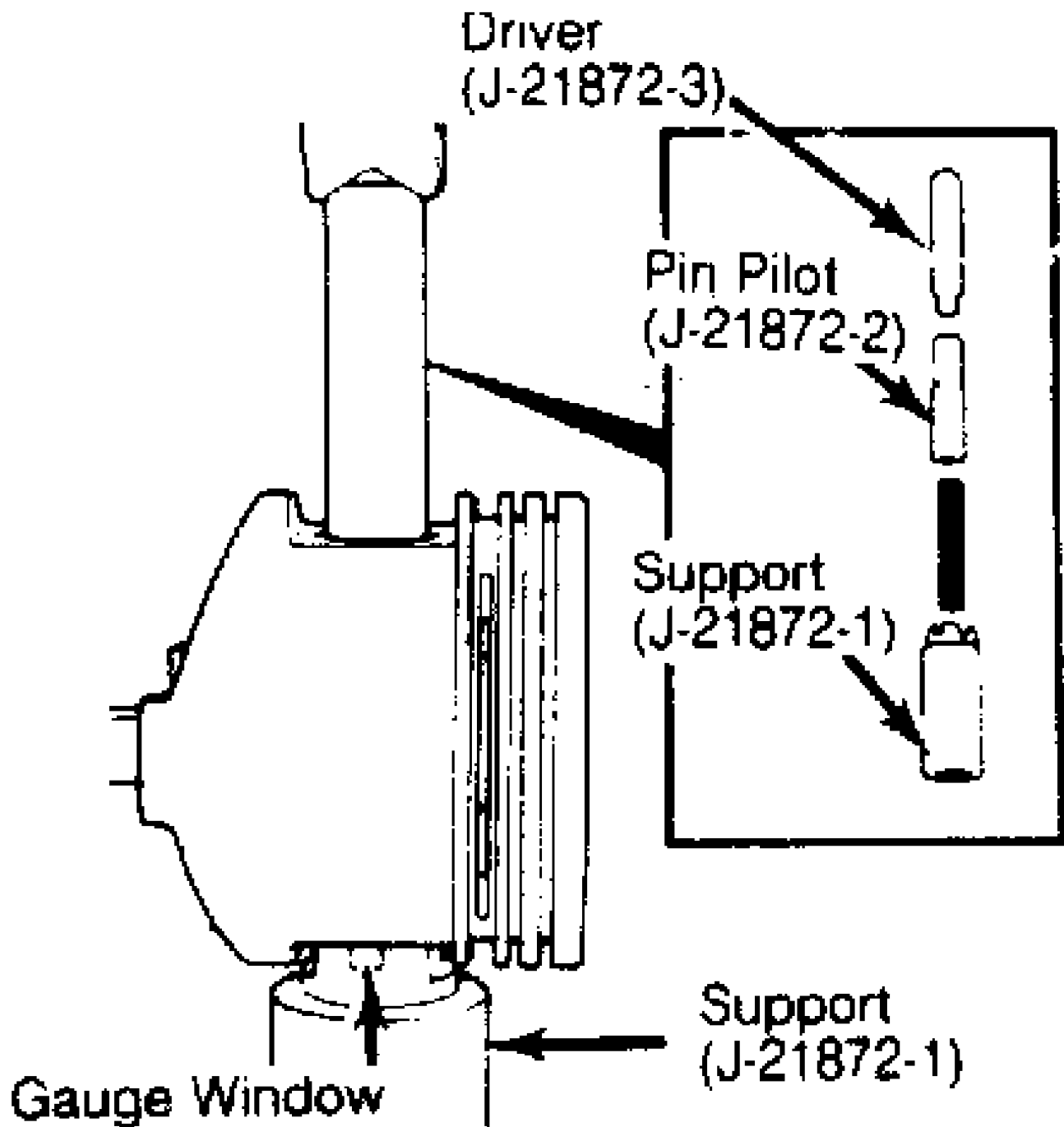


Fig. 6: Piston Pin Removal & Installation  
 Courtesy of Chrysler Motors.

2) Position driver inside pin. Using arbor press, press pin through rod and piston bores until pilot indexes with mark on support. Remove piston and connecting rod. Pin should be centered in rod  $\pm .0312$ " (.792 mm).

3) Piston pin installation requires a 2000 lb. (906 kg) press fit. Replace connecting rod if noticeably less effort is encountered.

## ROD BEARING

NOTE: Crankshaft journal diameters are indicated by a color coded mark placed on the adjacent counterweight or cheek toward the flanged (rear) end of crankshaft. Note color code to determine proper bearing usage. Check oil clearance after bearing installation.

### Removal

Remove oil pan. See OIL PAN REMOVAL at end of ENGINE section. Rotate crankshaft to position rod to be serviced at bottom of stroke. Mark bearing cap and connecting rod. Remove bearing cap with bearing. Push piston and rod assembly up to remove upper bearing.

### Installation

1) Note color code on edge of bearings removed. Install bearings. Using Plastigage method, check bearing clearances. Replace bearings as necessary to obtain correct clearance. Bearings are available in standard and undersize application.

2) If required, different sized upper and lower bearings may be installed to obtain correct oil clearance. Tighten bolts to specification. Check rod side play. Rotate crankshaft to ensure freedom of movement. Reverse removal procedure for remaining components. Tighten bolts to specification.

NOTE: Avoid combining bearing inserts in excess of .001" (.02 mm) difference in size.

## MAIN BEARING

### Removal

Remove oil pan. See OIL PAN REMOVAL at end of ENGINE section. Ensure main bearing caps are marked for location. Remove bearing cap. Rotate crankshaft to remove bearings. Note color code on edge of bearing.

NOTE: Crankshaft main bearing journal diameters are indicated by a color code. Color code is placed on the adjacent cheek toward the flanged (rear) end of crankshaft for all except the rear main. Rear main is color coded on the rear flange. Note color code to determine proper bearing usage. Check oil clearance after bearing installation.

### Installation

1) Note color code on edge of bearings removed. Install bearings. Ensure caps are installed in original location with arrow on cap facing toward front of engine. Using Plastigage method, check bearing clearances.

2) Replace bearings as necessary to obtain correct clearance. Bearings are available in standard and undersize applications. If required, different sized upper and lower bearings may be installed to obtain correct oil clearance.

NOTE: If different sized bearings are used, odd sized bearings must all be uniform in location (upper or lower). DO NOT use bearings with a thickness difference exceeding .001" (.02 mm).

3) Tighten bolts to specification. Check crankshaft end play. See CRANKSHAFT END PLAY in this article. Rotate crankshaft to ensure freedom of movement. Reverse removal procedure for remaining components. Tighten bolts to specification.

### Crankshaft End Play

1) Using dial indicator, check crankshaft end play. Inspect crankshaft thrust surfaces or thrust bearing for wear if not within specification. See ENGINE SPECIFICATIONS table.

2) Replace thrust bearing if required. When replacing thrust bearing, pry crankshaft forward then reward prior to tightening main bearing cap to specification. Recheck end play. Replace crankshaft if not within specification.

## REAR MAIN OIL SEAL

### Removal

1) Remove oil pan. See OIL PAN REMOVAL in this section.

Remove rear main bearing cap. Note direction of seal lip installation. Remove seal from bearing cap. Loosen all remaining main bearing cap bolts.

2) Using a brass drift, tap upper seal around crankshaft until seal protrudes enough to permit removal with pliers. Remove seal.

### Installation

1) Clean crankshaft seal surface. Coat seal-to-block contact areas with liquid soap. Lightly coat all seal lips with engine oil. See Fig. 7. Install upper seal into block with lip facing toward front of engine.

2) Apply Silicone sealer on both sides of lower seal tabs. Ensure no sealer is applied on seal lip. Apply liquid soap on seal-to-cap contact surfaces.

3) Install lower seal into bearing cap with lip facing toward front of engine. Ensure seal is firmly seated in bearing cap. Apply Silicone sealer to chamfered edges of bearing cap. See Fig. 7.

**CAUTION:** DO NOT apply Silicone sealer on cap-to-block contact surfaces. Sealer should only be applied to chamfered edges only.

4) Install rear main bearing cap. Tighten main bearing cap bolts to specification.

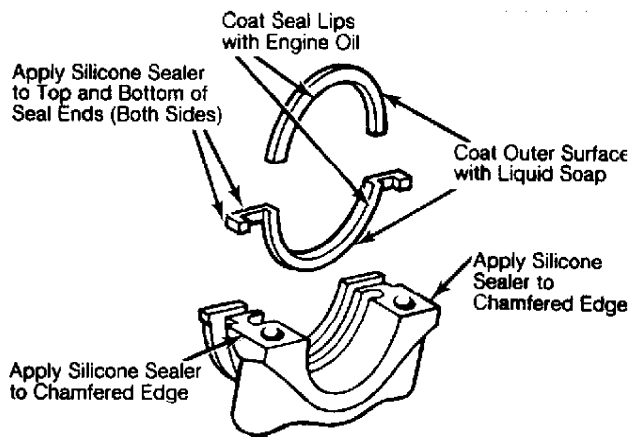


Fig. 7: Installing Rear Main Bearing Oil Seal  
Courtesy of Chrysler Motors.

## WATER PUMP

#### Removal

Drain cooling system. Disconnect radiator and heater hoses from pump. Remove drive belt(s). Remove fan shroud. Remove fan assembly. Remove electric cooling fan (if equipped). Remove power steering bracket from water pump. Remove water pump and gasket.

#### Installation

Ensure gasket surfaces are clean. Install water pump. Tighten bolts to specification. Ensure pump turns freely. Reverse removal procedures. Fill and purge air from cooling system.

**NOTE:** It may be necessary to remove heater hose to remove trapped air if system cannot be purged using following procedures.

#### Cooling System Air Purge (Vehicles W/Coolant Recovery)

Fill system to proper level. Place heater control to "HEAT" position and temperature control to "WARM" or "HIGH" position. Install coolant caps. Operate engine to normal operating temperature. Shut off engine and allow system to cool. Add coolant to recovery bottle. Repeat procedure to obtain correct coolant level.

#### Cooling System Air Purge (Vehicles W/O Coolant Recovery)

Fill system to proper level. Place heater control to "HEAT" position and temperature control to "WARM" or "HIGH" position. Operate engine to normal operating temperature with radiator cap removed. Add necessary coolant and install radiator cap.

**NOTE:** For further information on cooling systems, see appropriate article in the ENGINE COOLING section.

## **LUBRICATION**

### **CRANKCASE CAPACITY**

Crankcase capacity for 4.0L is 5 1/2 qts. (5.2L) or 5 qts. (4.7L) for 4.2L with oil filter change.

### **NORMAL OIL PRESSURE**

Normal oil pressure should be 37-75 psi (2.6-5.3 kg/cm<sup>2</sup>) maximum above 1600 RPM. Minimum oil pressure should be 13 psi (.9 kg/cm<sup>2</sup>) at 600 RPM.

### **OIL PRESSURE REGULATOR VALVE**

Oil pressure regulator valve is located in pump body. Valve is nonadjustable and serviced as an assembly.

### **ENGINE OILING SYSTEM**

Engine lubrication is provided by the distributor driven gear-type oil pump. Oil is supplied through the full-flow oil filter and into an internal oil passage. Internal passage provides oil to the lifter bores. Oil is then routed to camshaft and crankshaft bearings. Oil is supplied to rocker arms from the hydraulic lifters and through the push rods.

### **OIL PUMP**

#### Removal

Remove oil pan. See OIL PAN REMOVAL in this section. Remove

oil pump retaining bolts.

**CAUTION:** DO NOT move oil pick-up pipe in pump body. If oil pick-up pipe is moved, pick-up pipe must be replaced to ensure an airtight seal.

Disassembly & Inspection

1) Disassemble pump. See Fig. 8. Use feeler gauge and straightedge to check gear end clearance. Place straightedge across gears and pump body. Using feeler gauge, determine thickness feeler gauge which fits snugly between straightedge and gears.

2) With gears installed in pump body, insert feeler gauge between gear tooth and inner wall of pump body to check gear-to-body clearance. Rotate gears and measure clearance at each gear tooth.

3) Compare measurements to specification. See OIL PUMP SPECIFICATIONS table. Repair as necessary if not within specifications. Check pressure regulator valve for wear or binding in pump body. Replace components if wear or binding exists.

OIL PUMP SPECIFICATIONS TABLE

| Application                  | In. (mm)            |
|------------------------------|---------------------|
| Gear End Clearance .....     | .004-.008 (.10-.20) |
| Gear-to-Body Clearance ..... | .002-.004 (.05-.10) |

**CAUTION:** If pressure regulator valve is replaced, ensure replacement valve is the same diameter as that removed. Different diameter valves may be used.

Reassembly & Installation

1) Reverse procedures for reassembly and installation. Apply Permatex No. 2 to pick-up pipe prior to installation. Using Pipe Installer (J-21882), install pick-up pipe. Ensure pick-up pipe support bracket is aligned with pump cover bolt.

2) Fill gear cavity with petroleum jelly prior to installing cover. Apply Loctite on pump cover area. Install cover and bolts. Tighten bolts to specification. Check pump gears for freedom of rotation.

3) Install oil pump and new gasket. Tighten retaining bolts to specification.

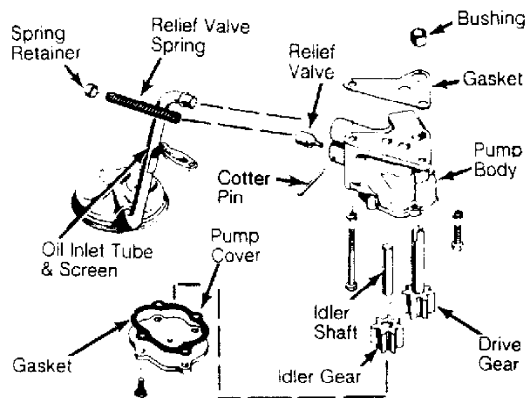


Fig. 8: Exploded View of Oil Pump Assembly  
Courtesy of Chrysler Motors.

**TORQUE SPECIFICATIONS TABLE**

TORQUE SPECIFICATIONS TABLE

| Application                      | Ft. Lbs. (N.m) |
|----------------------------------|----------------|
| Camshaft Sprocket Bolt           | 80 (109)       |
| Connecting Rod Cap Nut           | 33 (45)        |
| Crankshaft Pulley-to-Damper Bolt | 20 (27)        |
| Cylinder Head Bolt               |                |
| 4.0L                             |                |
| No. 11                           | 100 (135)      |
| All Others                       | 110 (149)      |
| 4.2L                             |                |
| No. 11                           | 75 (102)       |
| All Others                       | 85 (115)       |
| Exhaust Pipe-to-Manifold Bolt    | 20 (27)        |
| Fan & Hub Bolt                   | 18 (24)        |
| Flywheel-to-Crankshaft Bolt      | 105 (142)      |
| Fuel Rail Bolt                   | 20 (27)        |
| Intake & Exhaust Manifold Bolt   |                |
| 4.0L                             |                |
| Exhaust Manifold Bolts 1-5       | 23 (31)        |
| Exhaust Manifold Bolts 6-7       | 17 (23)        |
| Exhaust Manifold Bolts 8-11      | 23 (31)        |
| Exhaust Manifold Bolts 12-13     | 30 (41)        |
| 4.2L                             | 23 (31)        |
| Main Bearing Cap Bolt            |                |
| Step 1                           | 40 (54)        |
| Step 2                           | 70 (95)        |
| Step 3                           | 80 (109)       |
| Oil Pump Attaching Bolt          |                |
| Short                            | 10 (14)        |
| Long                             | 17 (23)        |
| Oxygen Sensor                    | 35 (47)        |
| Rocker Arm Bolt                  | 19 (26)        |
| Vibration Damper Bolt            | (1) 80 (109)   |
| Water Pump Bolts                 | 13 (18)        |

INCH Lbs. (N.m)

|                     |          |
|---------------------|----------|
| Engine Front Cover  |          |
| Bolt                | 60 (7)   |
| Studs               | 192 (22) |
| Oil Pan Bolt        |          |
| 1/4" X 20           | 84 (9)   |
| 5/16" X 18          | 132 (15) |
| Oil Pump Cover Bolt | 70 (8)   |
| Valve Cover Bolt    | 55 (5)   |

(1) - Clean and lubricate with oil prior to tightening.

**ENGINE SPECIFICATIONS**

**GENERAL ENGINE SPECIFICATIONS**

GENERAL SPECIFICATIONS TABLE

| Application  | In. (mm) |
|--------------|----------|
| 4.0L         |          |
| Displacement |          |

|                           |             |
|---------------------------|-------------|
| Cu. In. ....              | 242         |
| Liters .....              | 4.0         |
| Fuel System .....         | MPI         |
| HP@RPM .....              | 173 @ 2500  |
| Torque Ft. Lbs.@RPM ..... | 220 @ 2500  |
| Compression Ratio .....   | 9.2:1       |
| Bore .....                | 3.88 (98.4) |
| Stroke .....              | 3.44 (87.4) |
| 4.2L                      |             |
| Displacement              |             |
| Cu. In. ....              | 258         |
| Liters .....              | 4.2         |
| Fuel System .....         | 2-Bbl.      |
| HP@RPM .....              | 112 @ 3000  |
| Torque Ft. Lbs.@RPM ..... | 210 @ 2000  |
| Compression Ratio .....   | 9.2:1       |
| Bore .....                | 3.75 (95.3) |
| Stroke .....              | 3.90 (98.9) |

## VALVE SPECIFICATIONS

### VALVES SPECIFICATIONS TABLE

| Application                         | In. (mm)                |
|-------------------------------------|-------------------------|
| 4.0L                                |                         |
| Intake                              |                         |
| Head Diameter .....                 | 1.91 (48.51)            |
| Face Angle .....                    | 45°                     |
| Seat Angle .....                    | 44.5°                   |
| Seat Width .....                    | .040-.060 (1.02-1.52)   |
| Stem Diameter .....                 | .312 (7.92)             |
| Stem Clearance .....                | .001-.003 (.03-.08)     |
| Valve Lift .....                    | .424 (10.76)            |
| Exhaust                             |                         |
| Head Diameter .....                 | 1.50 (38.10)            |
| Face Angle .....                    | 45°                     |
| Seat Angle .....                    | 44.5°                   |
| Seat Width .....                    | .040-.060 (1.02-1.52)   |
| Stem Diameter .....                 | .312 (7.92)             |
| Stem Clearance .....                | .001-.003 (.03-.003)    |
| Valve Lift .....                    | .424 (10.76)            |
| Valve Spring Height Installed ..... | 1.625 (41.29)           |
| 4.2L                                |                         |
| Intake                              |                         |
| Head Diameter .....                 | 1.78-1.79 (45.3-45.5)   |
| Face Angle .....                    | 29°                     |
| Seat Angle .....                    | 30°                     |
| Seat Width .....                    | .040-.060 (1.02-1.52)   |
| Stem Diameter .....                 | .3715-.3725 (9.44-9.46) |
| Stem Clearance .....                | .001-.003 (.03-.08)     |
| Valve Lift .....                    | .405 (10.29)            |
| Exhaust                             |                         |
| Head Diameter .....                 | 1.40-1.41 (35.6-35.8)   |
| Face Angle .....                    | 44°                     |
| Seat Angle .....                    | 44.5°                   |
| Seat Width .....                    | .040-.060 (1.02-1.52)   |
| Stem Diameter .....                 | .3715-.3725 (9.44-9.46) |
| Stem Clearance .....                | .001-.003 (.03-.08)     |
| Valve Lift .....                    | .405 (10.29)            |
| Valve Spring Height Installed ..... | (1)                     |



(1) - Specification not provided from manufacturer.

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## PISTON/PIN/RING SPECIFICATIONS

### PISTONS, PINS & RINGS TABLE

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| Application            | In. (mm)                |
|------------------------|-------------------------|
| Piston Clearance ..... | .0009-.0017 (.023-.043) |
| Pins                   |                         |
| Piston Fit .....       | .0003-.0005 (.008-.013) |
| Rod Fit .....          | Press Fit               |
| Rings                  |                         |
| Ring No. 1 & No. 2     |                         |
| End Gap .....          | .010-.020 (.25-.51)     |
| Side Clearance .....   | .0017-.0032 (.043-.081) |
| Ring No. 3             |                         |
| End Gap .....          | .010-.025 (.25-.64)     |
| Side Clearance .....   | .001-.008 (.03-.020)    |

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## BEARING SPECIFICATIONS

### CRANKSHAFT MAIN & CONNECTING ROD BEARINGS TABLE

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| Application               | In. (mm)                    |
|---------------------------|-----------------------------|
| Main Bearings             |                             |
| Journal Diameter .....    | 2.4996-2.5001 (63.49-63.50) |
| Clearance .....           | .0010-.0025 (.03-.064)      |
| Thrust Bearing .....      | No. 3                       |
| Crankshaft End Play ..... | .0015-.0065 (.038-1.65)     |
| Connecting Rod Bearings   |                             |
| Journal Diameter .....    | 2.0934-2.0955 (53.17-53.23) |
| Clearance .....           | .001-.003 (.03-.08)         |
| Side Play .....           | .010-.019 (.25-.48)         |

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## CAMSHAFT SPECIFICATIONS

### CAMSHAFT TABLE

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| Application      | In. (mm)                  |
|------------------|---------------------------|
| Clearance .....  | .001-.003 (.03-.08)       |
| Lobe Lift .....  | .253 (6.43)               |
| Journal Diameter |                           |
| No. 1 .....      | 2.029-2.030 (51.54-51.56) |
| No. 2 .....      | 2.019-2.020 (51.28-51.31) |
| No. 3 .....      | 2.009-2.010 (51.03-51.05) |
| No. 4 .....      | 1.999-2.000 (50.77-50.80) |

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## VALVE SPRING SPECIFICATIONS

### VALVE SPRINGS TABLE

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| Application  | In. (mm) |
|--------------|----------|
| 4.0L         |          |
| Pressure (1) |          |

|              |       |                |                  |
|--------------|-------|----------------|------------------|
| Valve Closed | ..... | 66-74 @ 1.625  | (30-34 @ 45.5)   |
| Valve Open   | ..... | 205-220 @ 1.20 | (91-100 @ 30.48) |
| Free Length  | ..... | 1.82           | (46.23)          |

4.2L

|              |       |                |                |
|--------------|-------|----------------|----------------|
| Pressure (1) |       |                |                |
| Valve Closed | ..... | 64-72 @ 1.79   | (29-33 @ 45.5) |
| Valve Open   | ..... | 188-202 @ 1.41 | (85-92 @ 35.8) |
| Free Length  | ..... | 1.99           | (50.5)         |

(1) - Lbs. @ In. (Kg @ mm).

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