# Chrysler Corp. Import Engines

## 2000 cc & 2600 cc 4-CYLINDER

**Arrow Pickup, Challenger, Ram-50 Pickup & Sapporo**

## ENGINE CODING

### ENGINE IDENTIFICATION

Engine model code and serial number are stamped on engine block just below No. 1 spark plug on right side of block. Model codes are listed in table.

***ENGINE IDENTIFICATION***

| Application In. (cc) | Engine Model | Model Code |
|---|---|---|
| 121.7 (2000) | U | G52B |
| 155.9 (2600) | [1] F | G54B |

[1] — Code "W" for Pickup models.

## ENGINE, MANIFOLDS & CYLINDER HEAD

### ENGINE

#### Removal

**1)** Drain cooling system and remove engine undercover and hood. Remove battery and disconnect ground strap. Disconnect wiring from: ignition coil, vacuum control solenoid valve, fuel cut-off solenoid valve, alternator, starter, transmission switch, back-up light switch, water temperature gauge and oil pressure switch.

**2)** Remove air cleaner and disconnect attaching hoses. Disconnect accelerator linkage and heater hoses. Unbolt and separate exhaust pipe from manifold. Disconnect pipe mounting bracket at transmission.

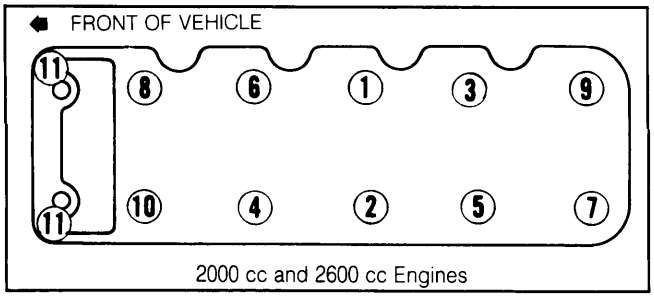
**3)** Disconnect hose between fuel filter and fuel pump return pipe. Remove radiator and radiator shroud. If equipped with automatic transmission, remove oil cooler pipe and tie rod when removing radiator. If equipped with power steering, remove and suspend oil pump.

**4)** Remove console box, then detach control lever assembly from transmission. Disconnect speedometer cable. Disconnect clutch cable from release lever and then disconnect cable from bracket (if equipped with manual transmission).

**5)** Drain transmission. If equipped with a transmission dynamic damper, remove damper. Remove locking bolts for attaching flange yoke at rear of propeller shaft and slide shaft out of transmission.

**6)** Support transmission on a jack and remove front and rear mount bolts. Remove rear engine support bracket. Attach lifting device to front and rear engine hangers. Lift engine and transmission assembly at an angle, upwards and out of engine compartment.

***Fig. 1: Cylinder Head Bolt Tightening Sequence***




2000 cc and 2600 cc Engines

*Remove bolts in reverse order.*

**NOTE: Keep transmission lower than engine when removing. If lower part of bell housing interferes with relay rod, raise rear of transmission to clear rod, then remove engine-transmission assembly.**

#### Installation

Reverse removal procedures and tighten mounting bolts and nuts to specifications with weight of engine on insulators. Replace all fluids and adjust all cables and linkages.

### CYLINDER HEAD & INTAKE MANIFOLD

#### Removal

**1)** Drain cooling system. Disconnect water hoses at cylinder head, manifold and carburetor. Remove breather and purge hose, vacuum hose at distributor and purge control valve.

**2)** Disconnect accelerator linkage, spark plug wires, water temperature gauge unit and exhaust manifold flange. Remove air cleaner, fuel line, distributor and fuel pump. Remove exhaust manifold, then intake manifold and carburetor assembly.

**3)** Remove rocker cover and breather. Remove semi-circular seal. Turn crankshaft so number 1 piston is at TDC on compression stroke. Mark chain with marker in line with sprocket mark.

**4)** Remove camshaft sprocket from camshaft. Remove cylinder head bolts in the reverse of the sequence shown in *Fig. 1.* Lift off cylinder head being careful not to twist sprocket and chain.

#### Installation

**1)** To install, reverse removal procedure. Gasket surfaces must be clean and NEW gaskets must be used. Use sealer ONLY at points where cylinder head joins front cover case and to intake manifold gasket around water passages.

**NOTE: Avoid sliding cylinder head when installing in order to prevent damage to gasket and aligning dowels (when installed). Engine should not be run with rocker cover off due to oil spray from rocker arms.**

**2)** Tighten cylinder head bolts to initial torque of 35 ft. lbs. (48 N.m). Follow sequence in *Fig. 1.* Repeat procedure, tightening bolts to final torque.

**3)** Temporarily set valve clearance to cold engine settings, then readjust to hot engine settings after engine is at normal operating temperature. Install rocker cover, air cleaner and breather hoses.

## CAMSHAFT

### ROCKER ASSEMBLY & CAMSHAFT

#### Removal

**1)** Remove air cleaner, breather hoses and purge line. Remove fuel pump and line. Disconnect spark plug wires and remove rocker cover. Remove breather and semi-circular seal. Slightly loosen camshaft sprocket

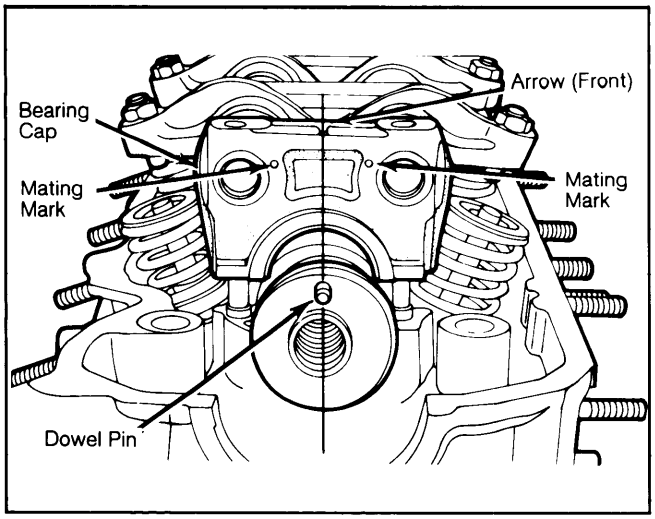
## 2000 cc & 2600 cc 4-CYLINDER (Cont.)

bolt and turn engine to TDC of compression stroke on No. 1 cylinder.

**2)** Make mating mark on timing chain and camshaft sprocket. Remove camshaft sprocket and hang sprocket on sprocket holder provided on timing chain lower front cover. Remove distributor drive gear.

**3)** Remove camshaft bearing caps, rocker arms and rocker shafts as an assembly. Remove camshaft.

***Fig. 2: Camshaft Installation Position, and Bearing Cap and Rocker Arm Shaft Mating Marks***



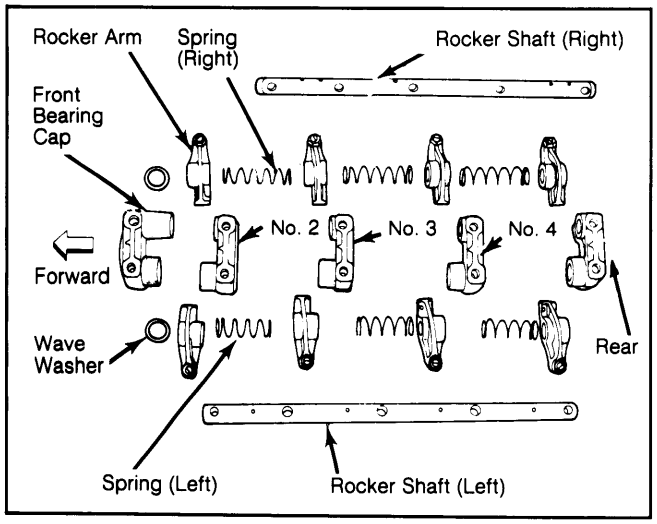

*Ensure camshaft dowel pin is in 12 o'clock position.*

**NOTE: If front and rear bearing caps are left inserted, rocker shaft assembly can be removed without separation of pieces.**

**Installation**

**1)** Lubricate camshaft lobes and camshaft bearing journals and install camshaft to cylinder head. Install rocker arm assembly to cylinder head. Camshaft should be positioned with dowel in the 12 o'clock position. *See Fig. 2.*

***Fig. 3: Exploded View of Rocker Assembly***




*Check rocker arms for wear or damage on all contact surfaces.*

**2)** Insert camshaft bearing cap bolts and tighten 7 ft. lbs. (10 N.m) in sequence of center, 2, 4, front and rear. Repeat sequence, tightening to specified torque. Install camshaft sprocket and distributor drive gear to camshaft.

**3)** Turn crankshaft backwards about 90° and tighten camshaft locking bolt. To complete installation, reverse removal procedures.

### COUNTERBALANCE DRIVE CHAIN

**Removal**

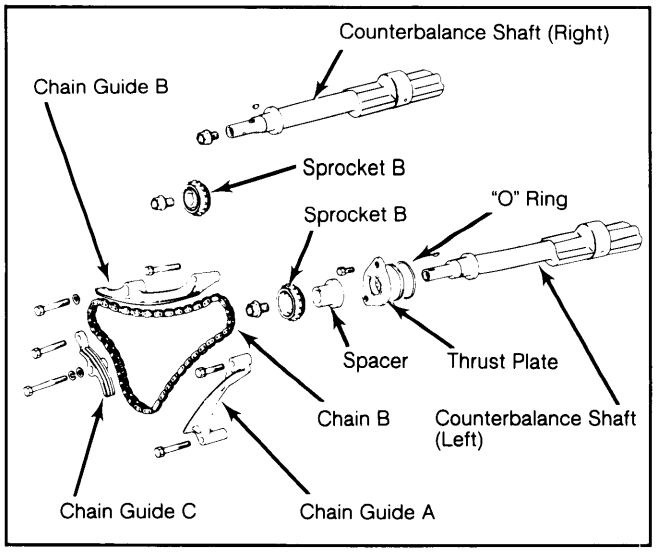
**1)** Drain coolant and oil. Disconnect battery cables. Remove rocker cover, breather and semi-circular seal. Remove alternator, fan belt, fan, water pump pulley and water pump. Remove distributor and oil pan.

**2)** Remove crankshaft pulley and timing chain case. Remove chain guides "A", "B", and "C", sprocket locking bolts and crankshaft sprocket. Remove both counterbalance shaft sprockets and drive chain. *See Figs. 4 and 5.*

**Installation**

**1)** Refer to *Figs. 4 and 5* for component location and reverse removal procedure. Ensure that mating marks on sprockets align with plated links on counterbalance chain.

***Fig. 4: Exploded View of Counterbalance Shafts and Drive Chain***




*Right counterbalance shaft is driven off of oil pump.*

**2)** Adjust tension by installing guides "A" and "C", then shake counterbalance shaft sprockets to take slack from chain. Adjust guide "B" so there will be .040-.140" (1.0-3.5 mm) clearance between guide and chain at point "P". Tighten guide mounting bolts and complete assembly.

### COUNTERBALANCE SHAFTS

**Removal**

**1)** With counterbalance drive chain removed, remove oil pump mounting bolts. Remove bolt holding oil pump driven gear and counterbalance shaft together, then remove oil pump mounting bolts. Remove oil pump, then withdraw counterbalance shaft.

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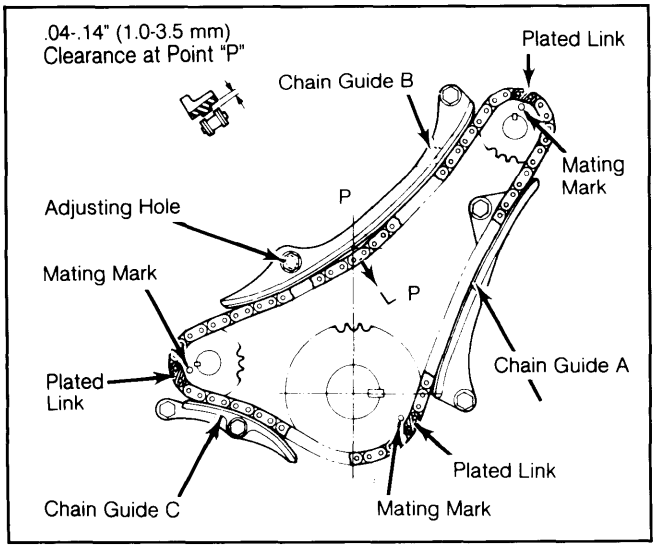
***Fig. 5: Counterbalance Drive Chain***




*Align plated links with mating marks.*

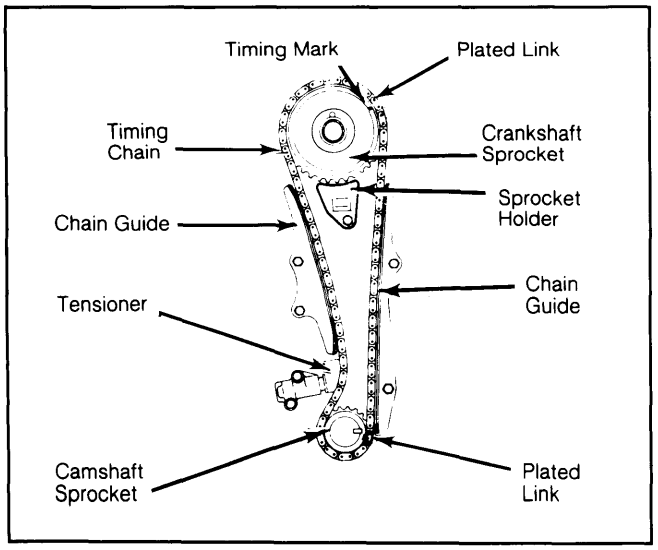
**NOTE: If bolt locking oil pump driven gear and counterbalance shaft is hard to loosen, remove oil pump and counterbalance shaft as an assembly. Then remove lock bolt to disassemble.**

**2)** Remove thrust plate supporting front of left counterbalance shaft. (Thrust plate is removed by threading bolts into plate holes at same time). Withdraw counterbalance shaft from cylinder block.

**Installation**

To install, reverse removal procedure.

***Fig. 6: Camshaft Sprocket Alignment and Installation***




*Align plated links with timing marks on sprockets.*

### TIMING CHAIN

**Removal**

With counterbalance drive chain removed, take off chain tensioner and right and left chain guides. Remove camshaft sprocket and timing chain.

**Installation**

**1)** To install, rotate crankshaft until number 1 piston is at TDC on compression stroke, align mating marks on sprockets and chain, then install chain on camshaft and crankshaft with keys and keyways aligned.

**2)** Inspect chain tensioner and complete installation in reverse order of removal.

## VALVES

### VALVE ARRANGEMENT

Left Side — Intake and Jet
Right Side — Exhaust

### JET VALVES

Using special Jet Valve Socket Wrench (MD998310), remove jet valves. Disassemble valve using spring pliers (MD998309) to compress spring and remove retainer lock. Check valve head and seat for damage and make sure jet valve slides smooth in body without play.

**CAUTION: Make certain that jet valve socket wrench is not tilted with respect to center of valve when used. If tool is tilted, stem may be bent resulting in defective valve operation and a broken wrench. Do not disturb jet valve and body combination. If defective, jet valve and body should be replaced as an assembly.**

### VALVE SPRINGS

**1)** With camshaft and rocker arm assembly removed, compress valve spring and remove retainer locks (keepers). Remove all retainers, springs, spring seats and valves, keeping in proper order for reassembly.

**2)** Check valve spring free length and pressure. Standard spring squareness should be 1.5° or less. If beyond 3° replace spring.

### VALVE GUIDE SERVICING

**1)** Check valve stem-to-guide clearance, and if clearance exceeds service limits as listed in table, replace valve guide with next oversize component. Guides are available in the following oversizes:

***VALVE GUIDE OVERSIZES***

| Size Mark | Guide Size In. (mm) | Cyl. Head Bore In. (mm) |
|---|---|---|
| 5 | 0.002 (.05) | .5138-.5145 (13.05-13.07) |
| 25 | 0.010 (.25) | .5216-.5224 (13.25-13.27) |
| 50 | 0.020 (.50) | .5315-.5323 (13.50-13.52) |

**2)** Heat cylinder head to approximately 480°F (249°C), and then use a valve guide tool to drive out each guide toward the combustion chamber. Ream guide bore in cylinder head to specified size (after head has cooled to room temperature).

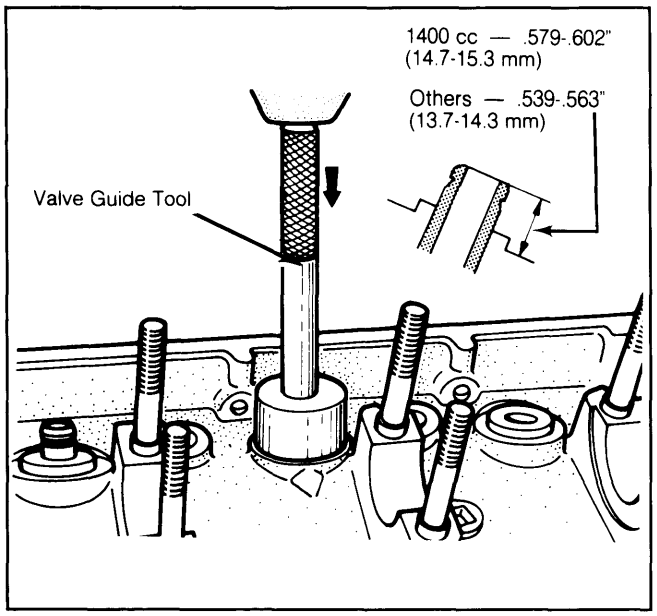
**3)** To install new guides, reheat head to same temperature, quickly insert and drive guides into head. Guide should protrude .539-.563" (13.7-14.3 mm) above head surface when properly installed. Check guide I.D. and ream as necessary.

## 2000 cc & 2600 cc 4-CYLINDER (Cont.)

### VALVE STEM OIL SEALS

After installing valve spring seat, place stem seal on guide. Use installer to lightly hammer seal into correct position as tool bottoms on head. Do NOT use old seals and do NOT twist seals when installing.

***Fig. 7: Valve Guide Installation and Height***

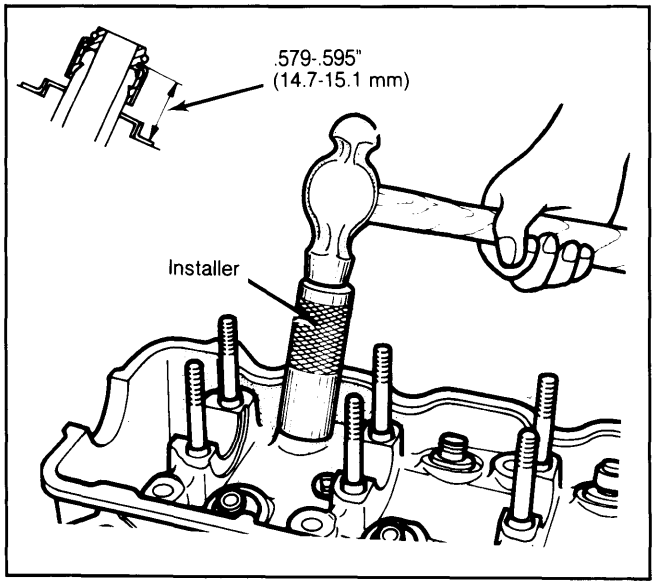



*Cylinder head must be heated prior to installation.*

### VALVE SEAT SERVICING

**1)** Check valve seat for damage or wear. Replace or rework seat, as necessary. If reworking seat, check valve guide first. Make proper replacement, if required, then check seat for necessary corrections.

***Fig. 8: Valve Stem Oil Seal Installation***




*Do not twist seal when installing.*

**2)** Recondition valve seat with grinder or cutter to specified contact width. After rework, valve and seat should be lapped with compound.

**3)** Valve seat sink (wear of seat inward allowing valve to seat too deep in head) must be checked by measuring installed height of spring between the spring seat and retainer with all spring components installed.

**4)** Standard dimension is 1.590" (40.4 mm) with an additional wear limit of .039" (1.0 mm). Replace valve seat if beyond limit.

**5)** Remove valve seat by thinning down with a cutter, then machine seat bore to proper size for replacement seat. Heat head to approximately 480°F (250°C) and press in oversize seat.

**6)** Replacement seats are available in .012" (.305 mm) and .024" (.610 mm) oversizes, marked "30" and "60" respectively. After installing, machine valve seat to specifications.

### VALVE CLEARANCE ADJUSTMENT

**1)** Ensure timing marks on camshaft sprocket and chain are aligned. With head assembly installed, temporarily adjust valves (sequence for adjustment; 1-3-4-2), according to following procedure.

**2)** At compression stroke TDC, for cylinder being adjusted, loosen rocker arm nuts; then, turning adjusting screw, adjust valve clearance to specifications.

**3)** Complete engine assembly and temporarily install rocker cover. Warm engine until coolant temperature is 170 to 180°F. With piston at TDC on compression stroke, back intake valve adjusting screw off 2 or more turns.

**4)** Adjust jet valve clearance, then adjust intake valve clearance. Adjust exhaust valve clearance and assure that all adjusting screw lock nuts are tightened securely.

***VALVE CLEARANCE***

| Application | Cold In. (mm) | Hot In. (mm) |
|---|---|---|
| Intake | .003 (.07) | .006 (.15) |
| Exhaust | .007 (.17) | .010 (.25) |
| Jet Valve | .003 (.07) | .006 (.15) |

**NOTE: Jet valve spring is comparatively weak and must not be forced in when making adjustment. Final valve clearance should be adjusted after cylinder head bolts have been tightened to final torque.**

## PISTONS, PINS & RINGS

### PISTON & CONNECTING ROD ASSEMBLY

**Removal**

**1)** Remove cylinder head and oil pan. Check to ensure connecting rods and rod caps are marked to aid in assembling components to their original position. Remove rear main seal housing.

**2)** Remove carbon ridge from cylinder bores. Remove connecting rod caps. Remove connecting rod and piston assembly through top of cylinder block.

**Installation**

**1)** To install, lubricate all internal surfaces with engine oil before installation. Make sure front mark on piston head faces front of engine.

## 2000 cc & 2600 cc 4-CYLINDER (Cont.)

**2)** Use a ring compressor to compress rings (without changing their position) and install piston and connecting rod assembly into cylinder block in their original position.

**3)** Tap lightly on piston dome with wooden handle tool while guiding connecting rod onto crankshaft. Install rod cap onto proper piston and connecting rod assembly. Tighten attaching bolts. Install cylinder head, rear main seal housing and oil pan.

### FITTING PISTONS

**1)** After checking block for distortion, cracks, scratches or other abnormalities, measure bores at 3 levels. If any distortion exceeds .001" (.02 mm) from standard bore size, block must be rebored and oversize pistons installed.

**NOTE: Pistons are available in standard, .010" (.25 mm), .020" (.50 mm), .030" (.75 mm) and .039" (1.0 mm) oversizes. Oversize pistons are stamped on crown to indicate oversize amount.**

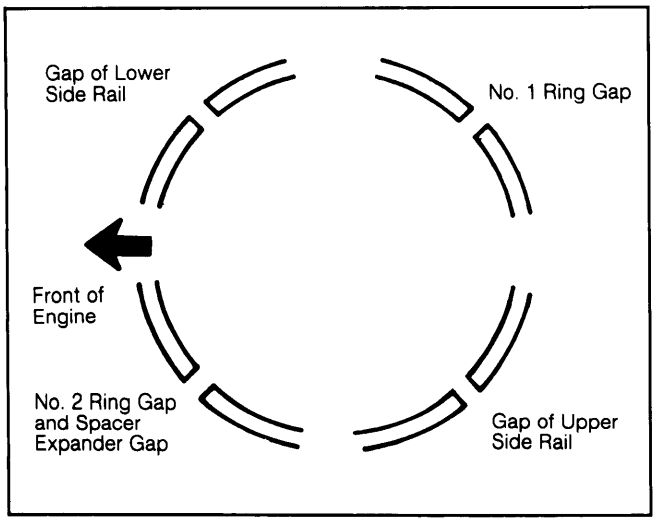
**2)** Check outside diameter of piston by measuring at a point .079" (2 mm) from bottom of skirt and at 90° to pin bore. Determine amount of cylinder reboring required to meet specified clearance.

**NOTE: Pin-to-rod fit at normal temperature will require 1654-3859 lbs. to press piston through rod.**

### PISTON PINS

Check piston pin-to-bore fit; pin should press in smoothly by hand (at room temperature). When assembling, apply engine oil to outside of pin and to piston pin bore, position rod to piston ("FRONT" mark upward), align pin with pressing tool, and press pin into piston and rod.

***Fig. 9: Piston Ring Gap Positions***




*Stagger ring gaps to minimize compression loss.*

### PISTON RINGS

**1)** Measure piston ring side and end clearance for all pistons and replace rings as necessary. When replacing a ring without correcting the cylinder bore, check ring end gap at lower part of cylinder that is less worn. When replacing a ring, be sure to use one of the same size.

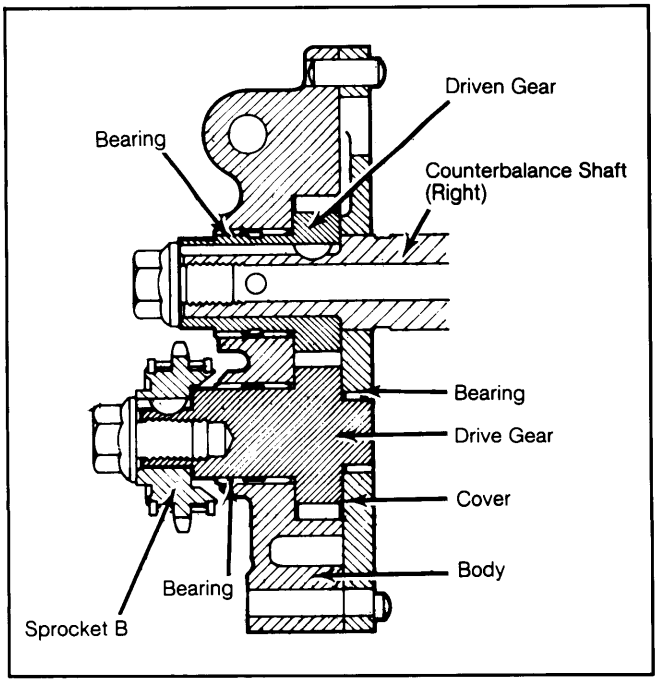
**2)** Install rings on piston with end gaps staggered at 120° intervals, but make sure no ring gap is in line with thrust face of pin bore. Also be sure the manufacturer's marks are facing upward when rings are installed.

**CAUTION: Install oil ring first WITHOUT using a ring expander. Spacer expander gap should be installed more than 45° from side rail gaps, and rails should turn smoothly when installed.**

***PISTON RING SIZES***

| Ring Size | Size Mark |
|---|---|
| Standard | No Mark |
| .010" (.25 mm) OS | 25 |
| .020" (.50 mm) OS | 50 |
| .030" (.75 mm) OS | 75 |
| .039" (1.00 mm) OS | 100 |

***Fig. 10: Cutaway View of Gear Type Oil Pump***




*Prime pump before installing.*

## CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

### MAIN & CONNECTING ROD BEARINGS

**1)** Inspect each bearing for peeling, melting, seizure or improper contact. Replace defective bearings. Measure outside diameter of crankshaft and connecting rod journals to determine if out-of-round or tapered.

**2)** Cut Plastigage to same length as width of bearing. Place it parallel with journal (not over oil holes).

## 2000 cc & 2600 cc 4-CYLINDER (Cont.)

Install crankshaft bearings and caps, tightening to specifications. Always install caps with arrow facing forward.

**NOTE: Do not turn crankshaft with Plastigage installed.**

**3)** Remove main bearing cap from crankshaft and measure Plastigage at widest part (using scale on Plastigage package). Repeat procedure for connecting rod bearings.

**4)** If clearance exceeds limits, bearing should be replaced or undersize bearing installed. Undersize bearings are available in .010" (.25 mm), .020" (.50 mm), and .030" (.75 mm) undersizes.

### THRUST BEARING

With crankshaft bearing caps installed, check thrust clearance (end play) by inserting feeler gauge between center main bearing and crankshaft thrust face. If clearance exceeds specified limits, replace center main bearing.

## ENGINE OILING

### ENGINE OILING SYSTEM

A force-feed type lubrication system is used. The pump is a gear type pump driven off the counterbalance shaft chain. Driven gear of pump drives the counterbalance shaft.

### CRANKCASE CAPACITY

4.5 qts. (4.3L).

### OIL PRESSURE

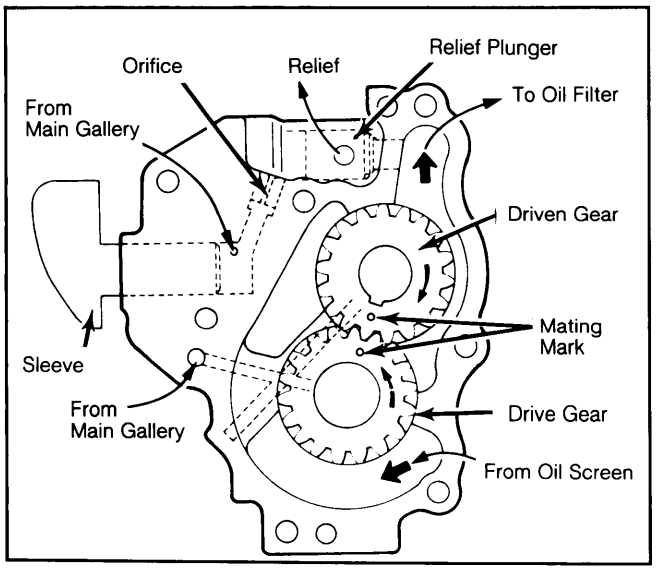
50-64 psi (3.5-4.5 kg/cm²) @2000 RPM.

### OIL PUMP

**Removal**

Pump is mounted at lower right side of engine block, and driven by countershaft drive chain. For removal, see Counterbalance Shafts.

***Fig. 11: Mating Marks of Oil Pump Gears***




*Align marks during assembly.*

**Installation**

To install, reverse removal procedure, assuring that oil pump gear mating marks are aligned and that Woodruff key on counterbalance shaft fits in keyway of driven gear.

**CAUTION: Prior to installing oil pump (all models), fill with sufficient amount of engine oil to prime pump.**

***OIL PUMP SPECIFICATIONS***

| Application | Clearance In. (mm) |
|---|---|
| Gear Tip-to-Body Clearance | .0043-.0059 (.11-.15) |
| Gear End Play | .0024-.0047 (.06-.12) |
| Drive Gear-to-Bearing | .0008-.0020 (.02-.05) |
| Drive Gear-to-Rear Bearing | .0016-.0028 (.04-.07) |

## ENGINE COOLING

### THERMOSTAT

190°F (88°C).

### RADIATOR CAP

12.8 psi (0.9 kg/cm²).

### COOLANT CAPACITY

9.5 qts. (9.0L).

### WATER PUMP

**Removal & Installation**

Drain cooling system and disconnect battery. Remove fan shroud if so equipped and remove lower radiator hose. Remove drive belt, cooling fan, fan clutch and pulley. Remove water pump. To install, reverse removal procedure using new gasket.

***TIGHTENING SPECIFICATIONS***

| Application | Ft. Lbs. (N.m) |
|---|---|
| Camshaft Bearing Caps | 14-15 (19-20) |
| Camshaft Sprocket | 37-43 (50-58) |
| Main Bearing Caps | 55-61 (75-83) |
| Connecting Rod Caps | 33-34 (45-46) |
| Crankshaft Pulley | 80-94 (109-128) |
| Cylinder Head Bolts | |
| Cold | 65-72 (89-98) |
| Hot | 73-79 (98-107) |
| Flywheel-to-Crankshaft | 94-101 (128-137) |
| Drive Plate-to-Crankshaft | |
| Auto. Trans. | 94-101 (128-137) |
| Jet Valve | 13-15 (18-20) |
| | **INCH Lbs. (N.m)** |
| Oil Pump | 72-74 (8-10) |

# Chrysler Corp. Import Engines

## 2000 cc & 2600 cc 4-CYLINDER (Cont.)

### ENGINE SPECIFICATIONS

#### *GENERAL SPECIFICATIONS*

| Year | DISPLACEMENT | | Fuel System | HP@RPM | Torque Ft. Lbs.@RPM | Compr. Ratio | BORE | | STROKE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cu. In. | cc | | | | | In. | mm | In. | mm |
| 1982 | 121.7<br>155.9 | 2000<br>2600 | 2-Bbl.<br>2-Bbl. | 90@5000<br>105@5000 | 103@3000<br>139@2500 | 8.5:1<br>8.2:1 | 3.31<br>3.59 | 84.0<br>91.1 | 3.54<br>3.86 | 90.0<br>98.0 |

#### *VALVES*

| Engine Size & 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) |
|---|---|---|---|---|---|---|---|
| 2000 cc & 2600 cc | | | | | | | |
| Intake | 1.7<br>(43) | 45° | 45° | .035-.051<br>(.9-1.3) | .315<br>(8.0) | .0012-.0024<br>(.03-.06) | .393 [2]<br>(10.0) |
| Exhaust | 1.38<br>(35) | 45° | 45° | .035-.051<br>(.9-1.3) | .315<br>(8.0) | .0020-.0035<br>(.05-.09) | .393<br>(10.0) |

[1] — Jet valve and body not individually serviceable. Replace as an assembly when defective.
[2] — 2600cc valve lift: .413" (10.5 mm).

#### *PISTONS, PINS, RINGS*

| Engine | PISTONS | PINS | | RINGS | | |
|---|---|---|---|---|---|---|
| | Clearance In. (mm) | Piston Fit In. (mm) | Rod Fit In. (mm) | Ring No. | End Gap In. (mm) | Side Clearance In. (mm) |
| 2000 cc & 2600 cc | .0008-.0016<br>(.02-.04) | [1] | Locked in Rod<br>[2] | No. 1<br>No. 2<br>Oil | .010-.018<br>(.25-.45)<br>.010-.018<br>(.25-.45)<br>.008-.035<br>(.2-.9) | .0024-.0039<br>(.06-.10)<br>.0008-.0024<br>(.02-.06)<br>..... |

[1] — Thumb press fit without rod installed.
[2] — Press in at 1654-3854 lbs. at room temp.

#### *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) |
| 2000 cc & 2600 cc | 2.362<br>(60) | .0008-.0028<br>(.02-.07) | No. 3 | .002-.007<br>(.05-.18) | 2.087<br>(53) | .0008-.0028<br>(.02-.07) | .004-.01<br>(.10-.25) |

#### *VALVE SPRINGS*

| Engine | Free Length In. (mm) | PRESSURE Lbs. @ In. (Kg @ mm) | |
|---|---|---|---|
| | | Valve Closed | Valve Open |
| 2000 cc & 2600 cc | 1.869<br>(47.5) | 61@1.59<br>(27.6@40.4) | ..... |

#### *CAMSHAFT*

| Engine | Journal Diam. In. (mm) | Clearance In. (mm) | Lobe Lift In. (mm) |
|---|---|---|---|
| 2000 cc & 2600 cc<br>Int. & Exh. | 1.661<br>(42.2) | .004-.008<br>(.10-.20) | .393<br>(10.0) |

[1] — Maximum wear limit is .020" (.5 mm).