1600 & 2000 cc 4 CYLINDER

ENGINE CODING

ENGINE IDENTIFICATION

Engine model code number is stamped on the left side of the engine block just below the starter. Engine serial number is stamped on right side of block on a flat just forward of the manifold. Numbers are decoded as follows:

Application In. (cc)	Model Code
97.5 (1600)	4G32
121.7 (2000)	4G52

ENGINE & CYLINDER HEAD

ENGINE

1) Drain cooling system, remove battery, disconnect ground strap, wiring from ignition coil, vacuum control solenoid valve, fuel cut-off solenoid valve, generator, 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.

4) Remove console box, then detach control lever assembly from transmission. Remove hood. Disconnect speedometer cable and back-up light switch wiring from transmission. Disconnect clutch cable from shift lever and then disconnect cable from its bracket (if equipped with manual transmission). Drain transmission. If equipped with transmission dynamic vibration damper, remove damper, remove locking bolts for attaching flange yoke at rear of propeller shaft, then draw shaft out of transmission.

5) Support transmission on a suitable jack and remove front and rear mount bolts. Remove rear engine support bracket. Attach suitable lifting device to front and rear engine hangers. Lift engine-transmission assembly obliquely upward and out of engine compartment. NOTE – *Keep transmission lower than engine when removing.*

INTAKE MANIFOLD

Removal & Installation – Drain cooling system, remove air cleaner assembly, water outlet hose, heater hoses, accelerator linkage and choke cable. Disconnect vacuum line, fuel line, water hose on carburetor side, and wiring for water temperature gauge. Remove carburetor, and then remove intake manifold. To install, reverse removal procedure and tighten all nuts and bolts.

CYLINDER HEAD

Removal – 1) Remove rocker arm cover. Turn crankshaft until No. 1 piston is at top of its compression stroke. NOTE – *If dowel pin at forward end of camshaft is at position shown in illustration when crankshaft pulley notch is aligned with timing mark "T" at front of timing chain case, then No. 1 piston is at TDC.*

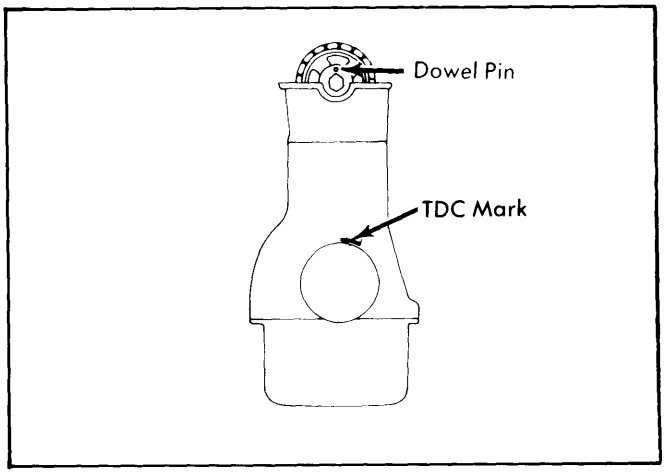

Fig. 1 Setting No. 1 Piston at TDC

2) Draw a mating mark in white paint on timing chain in line with mating mark on camshaft sprocket. Remove camshaft sprocket. Unscrew cylinder head bolts and nuts according to illustrated loosening sequence. CAUTION – *Loosen head bolts in two or three stages in order to prevent head warping.* Note dowel locator pins when removing head, and take care not to damage pins or twist chain when lifting off head.

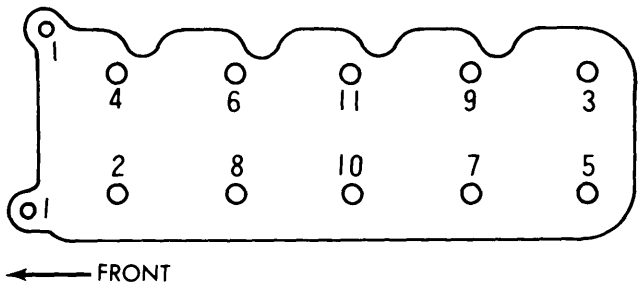

Fig. 2 Cylinder Head Loosening Sequence (1600 & 2000 cc)

Installation – 1) To install, reverse removal procedure, noting the following: Apply sealant to points at which cylinder head gasket will rest over junction of front cover chain case and cylinder block.

2) Tighten cylinder head bolts in sequence shown and in three or four stages. Install camshaft sprocket onto camshaft while pulling upward. If installation is difficult, slacken chain tensioner as required. Turn crankshaft back about 90°. Tighten sprocket lock bolt. Adjust valve clearance.

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1600 & 2000 cc 4 CYLINDER (Cont.)

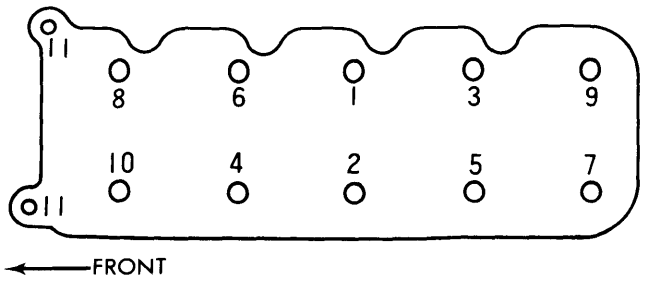

Fig. 3 Cylinder Head Tightening Sequence (1600 & 2000 cc)

Removal; 1600 with Counterbalance Shaft – 1) Turn crankshaft until No. 1 piston is at top of compression stroke, (notch on crankshaft pulley is in alignment with "T" position on timing indicator). Remove bolts in upper timing belt cover. Draw mating mark on timing belt in alignment with mark on camshaft sprocket.

2) Remove camshaft sprocket, with timing belt attached, from camshaft. A holder provided on the timing belt lower front cover holds the sprocket in position. Remove upper under cover. Remove head bolts in reverse of tightening sequence. Head bolts should be loosened in two or three stages to prevent cylinder head warpage.

Installation; 1600 with Counterbalance Shaft – 1) To install, reverse removal procedure. Dowel pins are provided at front and rear of cylinder block. Do not slide cylinder head when installing. Pull camshaft sprocket upward while installing.

2) If camshaft sprocket is hard to lift and cannot be easily fitted into spacers, insert a screwdriver into the top hole of sprocket, set the end of the screw driver under the ridge portion of the upper under cover and pry sprocket up.

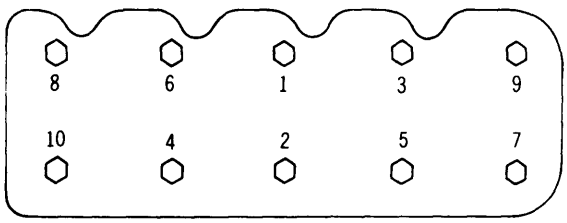

Fig. 4 Cylinder Head Tightening Sequence (1600 cc with Counterbalance Shaft)

VALVES

VALVE ARRANGEMENT

Intake – Left side.
Exhaust – Right side.

ROCKER ARM & CAMSHAFT ASSEMBLY

Removal – Remove camshaft bearing cap nuts. Holding assembly by front and rear caps, lift rocker arm shaft off head. Disassemble individual components, keeping rocker arms and corresponding components in proper sequence for reassembly. Remove camshaft from cylinder head.

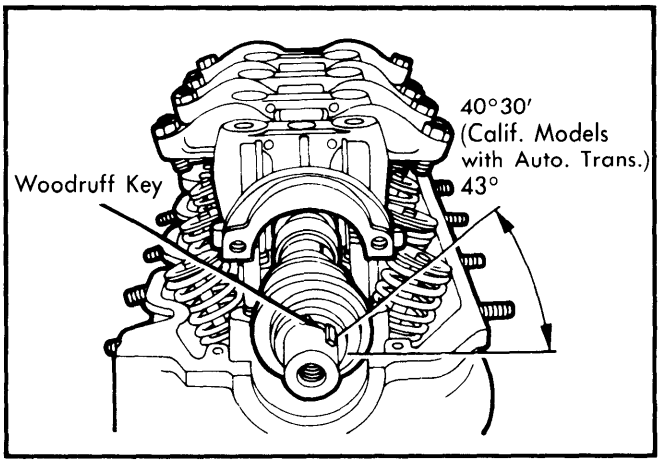

Fig. 5 Camshaft Woodruff Key Position

NOTE – *On 1600 cc with counterbalance shaft, distributor drive is at front of camshaft. Camshaft woodruff key must be positioned at a 40° 30' angle to valve cover gasket surface (Fig. 5).*

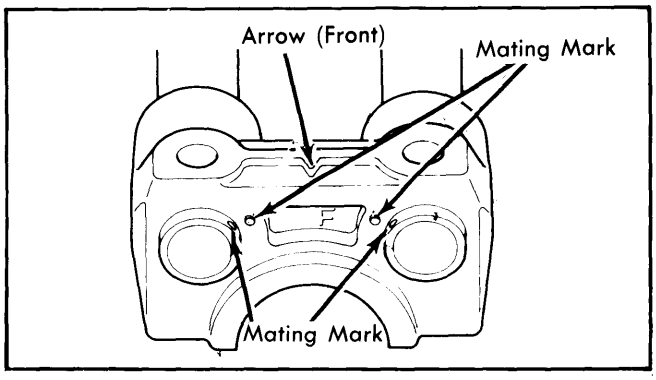

Fig. 6 Location of Rocker Shaft Mating Marks

Installation – 1) Install camshaft on head after completing servicing described within this article. See *Camshaft*. Install caps, rocker arms, springs, and wave washers onto both rocker arm shafts. NOTE – *The front bearing cap has embossed mating mark on front side, which should be aligned with indent marks on front end of rocker arm shafts. Each cap also has arrow which marks direction of installation (front).* Ensure all parts are returned to original positions. On 1600 cc models, right side rocker arm shaft has eight oil holes and left side has four. On 2000 cc models, right side has 12 oil holes and left side has 4.

2) Install assembled rocker arm shaft assemblies to cylinder head. Be sure that dowel pin is directly on top of camshaft. Tighten caps in following order: 3, 2, 4, front, and rear. NOTE – *No. 4 and front caps are to be tightened together with the valve cover bracket.*

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1600 & 2000 cc 4 CYLINDER (Cont.)

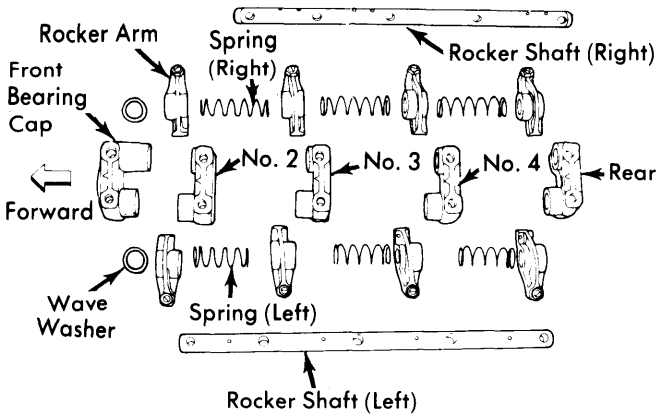

Fig. 7 Exploded View of Engine Rocker Arm and Shaft Components

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	.002 (.05)	.5138-.5145 (13.05-13.07)
25	.010 (.25)	.5216-.5224 (13.25-13.27)
50	.020 (.51)	.5315-.5323 (13.50-13.52)

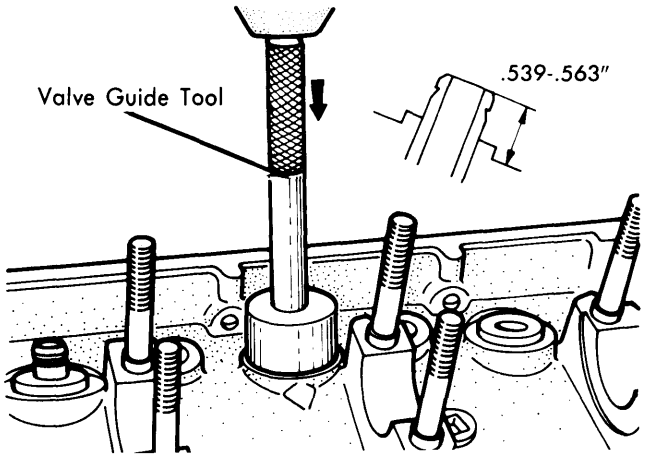

Fig. 8 Valve Guide Installation and Height

2) Heat cylinder head to approximately 480°F (249°C), and then use a suitable 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" (13.69-14.30 mm) above head surface, as illustrated. Check guide I.D. and ream as necessary.

VALVE STEM OIL SEALS

After installing valve spring seat, place stem seal on valve guide. Using suitable tool (MD998005), lightly hammer seal into proper position (see illustration). When installing, use care not to twist seal. Do not reuse old seals.

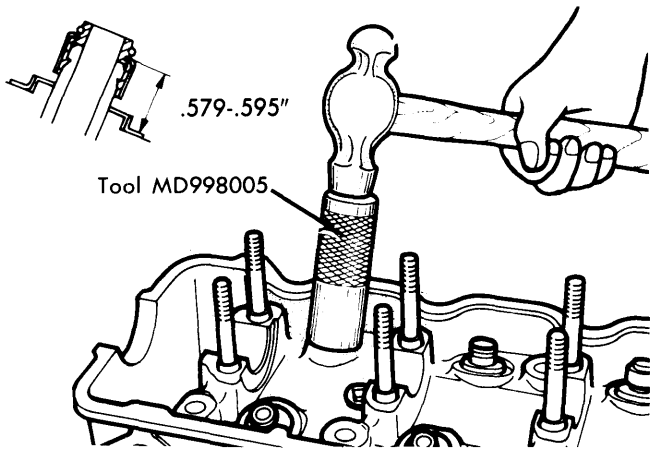

Fig. 9 Valve Stem Oil Seal Installation and Height

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.

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

3) Check valve seat shrinkage by measuring installed height of spring between spring seat and retainer (with all spring components installed). Maximum allowable spring length for both intake and exhaust valve springs is 1.590 (40.39 mm).

4) Remove valve seat by thinning down with a suitable cutter, then machine seat bore to proper size for replacement seat. Heat head to approximately 480°F (250°C) and press in oversize seat. Replacement seats are available in .012" (.305 mm) and .024" (.610 mm) oversizes, marked "30" and "60" respectively.

VALVE SPRING

1) With camshaft removed, install spring compressor, remove retainer lock, retainer and spring. Keep components in proper order for reassembly.

2) Install valve spring with enamel identification mark toward rocker arm. Compress spring, making sure spring compressor does not interfere with stem seal. Install retainer and lock.

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1600 & 2000 cc 4 CYLINDER (Cont.)

VALVE SPRING INSTALLED HEIGHT

1) Check free length and tension of each valve spring. If beyond specifications, replace spring. Using a square, check each spring for proper squareness (1.5°or less). Replace spring if excessively out of square.

2) Measure installed height of spring between spring seat and retainer, with spring seat, retainer and retainer lock installed.

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

2) After completion of engine assembly, run engine until coolant temperature is 176°F, then readjust valves.

NOTE – *Torque head bolts, with engine warm, prior to final valve clearance adjustment; otherwise, clearance will change if head bolts are torqued last.*

Valve Clearance

Application	Cold In. (mm)	Hot In. (mm)
Intake	.003 (.08)	.006 (.15)
Exhaust	.007 (.18)	.010 (.25)

PISTONS, PINS & RINGS

PISTON & CONNECTING ROD ASSEMBLY

Removal – 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 carbon ridge from cylinder bores. Remove connecting rod caps. Remove connecting rod and piston assembly through top of cylinder block.

Installation – To reinstall, lubricate all internal surfaces with engine oil before installation. Make sure front mark on piston head faces front of engine. Use a ring compressor to compress rings (without changing their position) and install piston and connecting rod assembly in to cylinder block in their original position. 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 and oil pan.

FITTING PISTONS

1) After checking block for distortion (not to exceed .002"-.05 mm), cracks, scratches or other abnormalities, measure bores at three levels. If any bore distortion exceeds .008" .20 mm from standard bore size, refinish all cylinders and install oversize pistons.

Oversize Pistons

Application	Size Mark	Diam. In. (mm)
1600 cc		
.010" OS	0.25	3.0374 (77.15)
.020" OS	0.50	3.0472 (77.40)
.030" OS	0.75	3.0571 (77.65)
.039" OS	1.00	3.0669 (77.90)
2000 cc		
.010" OS	0.25	3.3163 (84.23)
.020" OS	0.50	3.3262 (84.49)
.030" OS	0.75	3.3360 (84.73)
.039" os	1.00	3.3464 (85.00)

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.

3) To prevent distortion due to the high temperature of the cutting process, this operation should be done in stages and in sequence of 2-4-1-3 or 3-1-4-2. Hone bore to finish size, using a honing angle of 30-45°. Ensure piston-to-cylinder clearance is within specification.

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.

PISTON RINGS

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. 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.

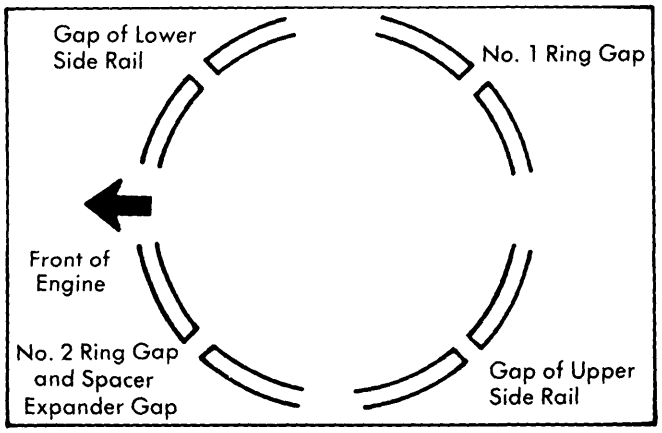

Fig. 10 Piston Ring Gap Positions

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1600 & 2000 cc 4 CYLINDER (Cont.)

NOTE – *Ensure oil ring gap is opposite the expander joint. The following ring sizes are available:*

Piston Ring Sizes

Ring Size	Size Mark
1600 & 2000 cc	
Standard	No Mark
.010" (.25 mm) OS.	25
.020" (.50 mm) OS.	50
.030" (.75 mm) OS.	75
.039" (1.00 mm) OS.	100

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). 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. 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.

CAMSHAFT

COUNTERBALANCE SHAFT & TIMING BELT

1600 – Timing belt drives camshaft, oil pump and (left) counterbalance shaft. A separate belt drives counterbalance shaft on the right side.

Removal – 1) With engine removed and timing belt marked. Remove crankshaft pulley, upper and lower timing belt front covers. Loosen belt tensioner mounting nut and bolt. Remove timing belt. Remove camshaft sprocket, crankshaft sprocket and flange, remove timing belt tensioner.

2) Remove plug at bottom of left side of cylinder block and insert a screwdriver, to keep left counterbalance shaft in position. Remove crankshaft sprocket and counterbalance shaft sprocket from right side. Remove timing belt covers from right side. Remove water pump and cylinder head assembly. Remove oil pan and oil pick-up screen. Remove oil pump cover.

3) Insert screwdriver throuqh pluq hole in cylinder block, to hold counterbalance shaft. Loosen oil pump driven gear bolt. Remove front case with left counterbalance shaft attached. Remove right counterbalance shaft from cylinder block.

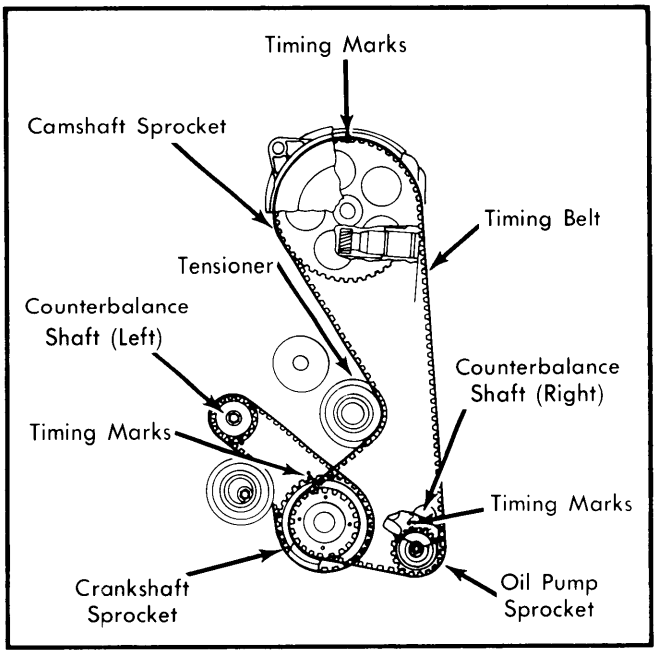

Fig. 11 Counterbalance Shaft and Timing Belts (1600 cc)

Installation – 1) To install, reverse removal procedure. Check to ensure that all timing marks are in alignment. To adjust tension on right side. Lift tensioner toward belt; tighten nut and bolt. Make sure that the shaft of the tensioner does not rotate in the same direction as the bolt tightens. Correct adjustment is obtained when belt deflects .20-.27" (5-7 mm) with finger pressure.

2) To adjust counterbalance shaft and timing belt, start with timing belt installed on crankshaft sprocket, oil pump sprocket and camshaft sprocket, making sure that all timing marks are in alignment. With tensioner installed, lightly push up toward mounting nut, to make sure that timing belt comes into complete mesh with camshaft sprocket. Tighten mounting nut and bolt (tighten nut first).

3) Turn crankshaft through a complete rotation in normal direction. (Make sure that crankshaft is turned smoothly and in the correct direction.) Loosen tensioner mounting nut and bolt. At this time, the loose side of the belt will be given tension. Tighten nut and bolt (nut first).

COUNTERBALANCE SHAFT & CHAIN

NOTE – *The counterbalance shafts on 2000 cc models are driven by the crankshaft via chains. The left counterbalance shaft rotates in the same direction as the crankshaft. The right*

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1600 & 2000 cc 4 CYLINDER (Cont.)

counterbalance shaft, is driven by the oil pump and rotates in the opposite direction.

Removal – With engine removed and placed upside down, remove oil pan and screen. Remove crankshaft pulley, flywheel and timing chain case. Remove chain guides A, B and C *(See Fig. 9)*. Remove sprocket B locking bolts. Remove crankshaft sprocket B, counterbalance shaft sprocket B and chain B.

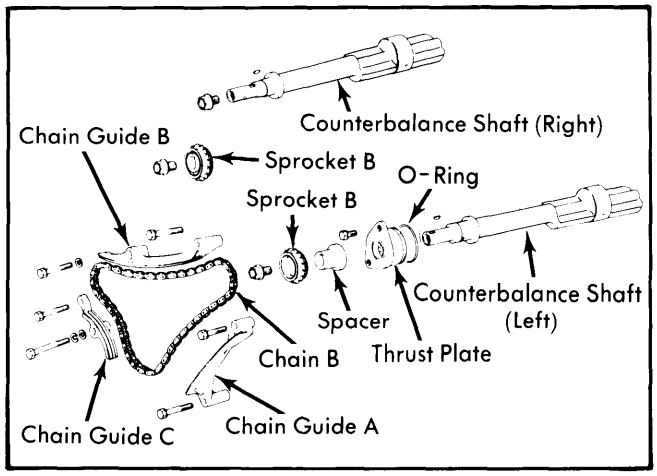

Fig. 12 Exploded View of Counterbalance Shaft (2000 cc)

Installation – To install reverse removal procedure. To adjust tension of chain B, tighten chain guide A mounting bolt. Tighten chain guide C mounting bolt. Shake right and left B sprockets to collect slack at point P *(See Fig. 10)*. Adjust position of chain guide C so when chain is pulled in direction of arrow Y, clearance between chain guide B and links of chain B will be .04-.14" (1.0-3.6 mm). Tighten bolts securely. Install chain case and gasket.

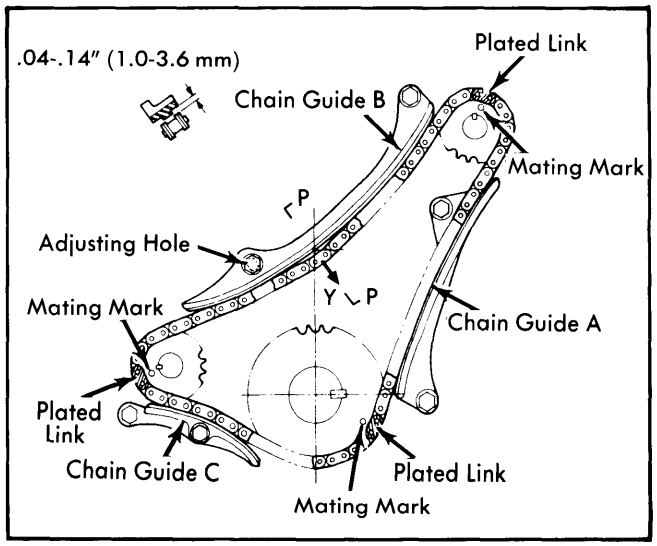

Fig. 13 Adjusting Tension of Counterbalance Shaft (2000 cc)

COUNTERBALANCE SHAFTS

Removal & Installation, 2000 cc – 1) With balancer and timing chain removed, proceed as follows: Remove oil pump mounting bolts. Remove bolt locking oil pump driven gear and right counterbalance shaft. Withdraw right counterbalance shaft from cylinder block.

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. To install, reverse removal procedure.

1600 cc with Counterbalance Shaft – Oil pump is gear type. It also serves as a source to drive counterbalance shaft.

Removal – With timing belt removed, remove oil pump sprocket and remove plug at bottom of left side of cylinder block. Insert a screwdriver in hole to keep counterbalance shaft in position. Remove upper and lower timing belt under covers. Remove oil pan and oil screen, remove oil pump cover and assembly.

Inspection – Check entire body for cracks and abnormal wear. Check cover for cracks or wear, replace if badly worn. When bearing replacement is necessary, replace oil pump body assembly.

Installation – Reverse removal procedure, checking all alignment marks (*Fig. 14*).

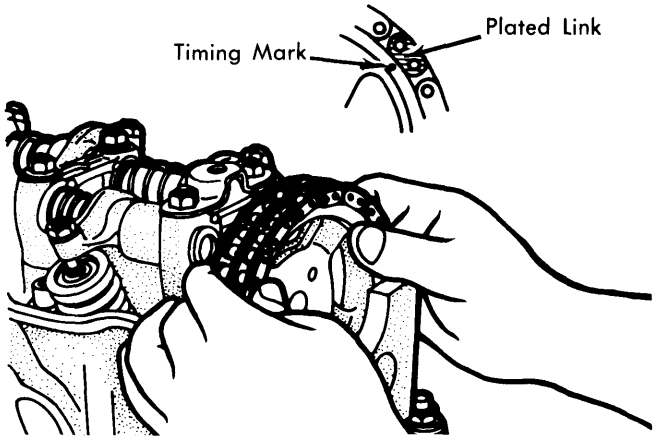

Fig. 14 Camshaft Sprocket Alignment and Installation

TIMING CHAIN & BELT

1600 & 2000 cc Timing Chain Removal – With timing case front covers removed and piston of No. 1 cylinder at TDC, remove crankshaft and camshaft sprockets. Depress timing chain tensioner, while removing timing chain. Remove camshaft sprocket holder and timing chain guides.

Installation – To install, reverse removal procedure ensuring

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1600 & 2000 cc 4 CYLINDER (Cont.)

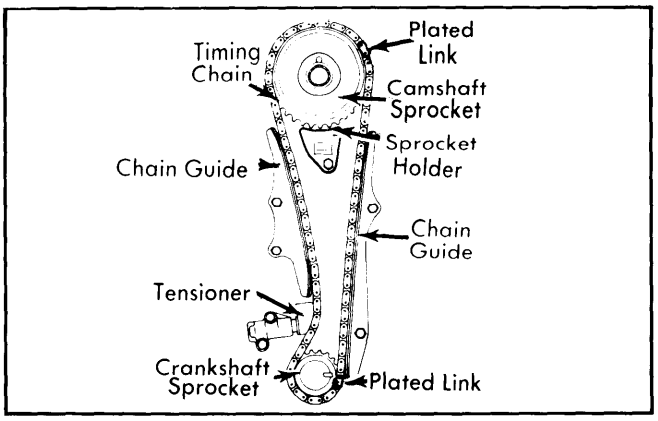

Fig. 15 Timing Chain Alignment and Installation

that chrome plated links of timing chain are in alignment with mating marks (punch marks) of crankshaft and camshaft sprockets.

1600 cc Timing Belt Removal – With timing case covers removed and piston of No. 1 cylinder at TDC, loosen tensioner mounting nut and bolt. Move tensioner to release pressure from timing belt. Tighten nut and bolt to hold tensioner in position and remove timing belt.

Installation – 1) Align all timing marks (*Fig. 14*). Install timing belt. Loosen belt tensioner. Lightly push tensioner toward mounting nut to ensure that belt and sprocket come into complete mesh. Tighten tensioner mounting nut and bolt.

2) Turn crankshaft through a complete rotation, (do not turn in reverse direction, do not push or shake belt). Loosen tensioner nut and bolt; belt will be at correct tension. Tighten tensioner mounting nut and bolt (tighten nut first). Reinstall remaining components.

CAMSHAFT

1) With camshaft removed from vehicle, first visually check camshaft for any obvious defects. Attach a dial gauge to No. 2 or No. 3 journal. Turn camshaft one complete revolution and read the total gauge measurement. Divide this amount in half to determine amount of camshaft bend.

2) Next, check camshaft end play by measuring with a feeler gauge (camshaft installed) between front bearing cap and camshaft end piece.

3) Check cam lobes and profile for damage. If lobe height is less than specified, replace camshaft.

4) Check each camshaft bearing cap for damage. If inner surface is excessively damaged, replace head assembly. Measure each cap I.D. with a dial gauge after installing cap to its appropriate bearing half. Measure camshaft journal diameters, then use these measurements to determine if camshaft clearance is within specifications.

Camshaft Specifications

Application	1600 cc	2000 cc
End Play	.002-.006" (.05-.15mm)	.004-.008" (.1-.2mm)
Bend	.0008" (.02mm)	.0008" (.02mm)
Height	①.020" (0.5mm)	①.020" (0.5mm)

① – Minus

ENGINE OILING

Crankcase Capacity – 4.5 quarts

Oil Pressure Switch Operating Pressure – 2.8-5.7 psi (20-40 kg/cm²)

Normal Oil Pressure – 14.2 psi (99.8 kg/cm²), minimum, at idle.

Oil Pump Pressure Relief Valve Opens – 56.9-71.1 psi (400-500 kg/cm²) at 2,000 RPM.

Oil Filter – Full-flow, cartridge type.

ENGINE OILING SYSTEM

1600 cc – Lubrication system is force-feed type, using a trochoid type pump. The pump body is integral with timing chain case.

2000 cc – Oil pump is gear type and also serves as a source to turn counterbalance shaft.

OIL PUMP

Removal, 1600 cc – Remove splash shield from under body. Remove oil filter, remove oil pump cover bolts. Remove rotor and assembly with cover. Check inner and outer rotors, if worn beyond specification, replace.

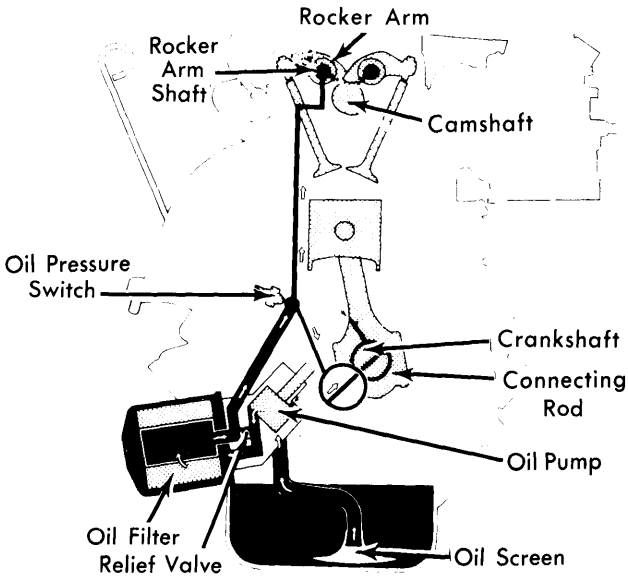

Fig. 16 Cutaway View of Engine Oiling System

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1600 & 2000 cc 4 CYLINDER (Cont.)

ENGINE OILING (Cont.)

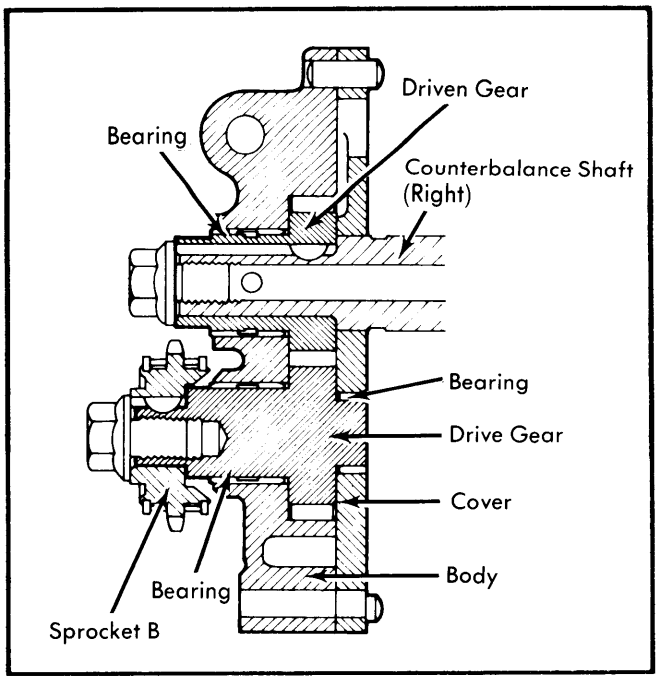

Fig. 17 Cutaway View of Oil Pump

Installation – Reverse removal procedure.

Removal, 2000 cc – Drain engine oil. Remove oil pan and gasket (discard gasket). Remove bolt locking oil pump drive gear and right counterbalance shaft. Remove oil pump mounting bolts. Withdraw oil pump from cylinder block.

Inspection – Check entire body for cracks and excessive wear. Check gears for ridge wear. Check oil holes and passages for clogging. Check cover for ridge wear. Replace all worn parts. Measure all clearances as shown in *Fig. 14*.

CAUTION – *Prior to installation, fill oil pump with a sufficient amount of engine oil through delivery port.*

Installation – **NOTE** – *Make sure keyway of oil pump driven gear fits woodruff key at end of counterbalance shaft, and does not go out of keyway.* After installing pump into block, firmly tighten oil pump mounting bolts. Tighten counterbalance shaft and driven gear mounting bolt.

Oil Pump Specifications

Application	Clearance In. (mm)
1600 cc Trochoid Type	
Inner-to-Outer Rotor	.0047 (.12)
Rotor-to-Cover End Play	.0008-.0039 (.02-.1)
Outer Rotor-to-Chain Case	.0039-.0063 (.1-.16)
1600 & 2000 cc Gear Type	
Gear Teeth-to-Housing	.0041-.0059 (.1-.15)
Gear End Play	.0024-.0047 (.06-.12)
Gear-to-Bearing	.0008-.0018 (.02-.046)
Drive Gear (Rear)-to-Bearing	.0017-.0026 (.044-.066)

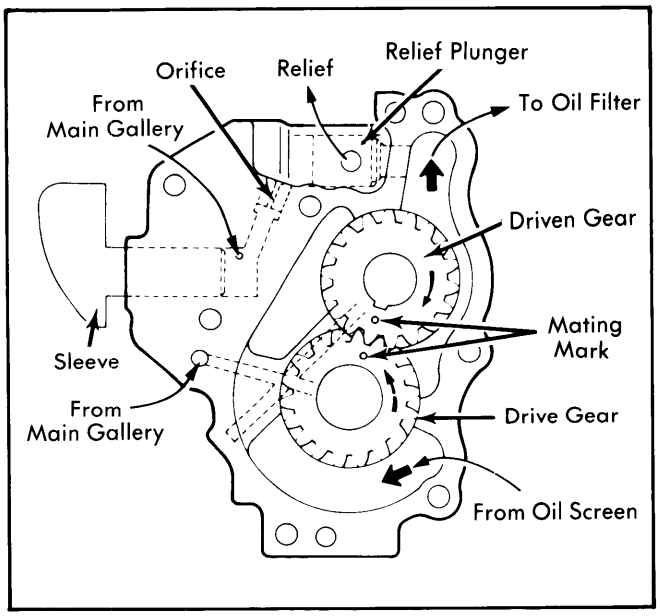

Fig. 18 Mating Marks of Oil Pump Gears

ENGINE COOLING

Thermostat – 180°F (82°C)

Radiator Cap – 13 psi (91.4 kg/cm²)

Cooling System Capacity
1600 cc – 7.7 qts. (7.3 liters)
2000 cc – 9.5 qts. (9 liters)

WATER PUMP

Drain coolant, loosen hoses from pump and loosen alternator. Remove fan, pulley, and fan belt. Remove water pump bolts. To install, reverse removal procedure.

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1600 & 2000 cc 4 CYLINDER (Cont.)

ENGINE SPECIFICATION

GENERAL SPECIFICATIONS

Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1977	97.5	1600	2-Bbl.	83@5500	89@3500	8.5:1	3.03	77	3.39	86.1
	121.7	2000	2-Bbl.	96@5500	109@3500	8.5:1	3.31	84.1	3.54	89.9

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)
1600 cc							
Intake	1.50 (38.1)	45°	45°	.035-.051 (.9-1.3)	.315 (8.0)	.001-.0022 (.025-.055)	.....
Exhaust	1.22 (31.0)	45°	45°	.035-.051 (.9-1.3)	.315 (8.0)	.002-.0033 (.05-.085)	.....
2000 cc							
Intake	1.65 (41.9)	45°	45°	.035-.051 (.9-1.3)	.315 (8.0)	.001-.0023 (.025-.058)	.....
Exhaust	1.34 (34.0)	45°	45°	.....	.315 (8.0)	.002-.0035 (.05-.088)	.....

PISTONS, PINS, RINGS

Engine	PISTONS Clearance In. (mm)	PINS		RINGS		
		Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
1600 cc	.0008-.0016 (.02-.04)	①	Press Fit	No. 1	.008-.016 (.2-.4)	.0012-.0028 (.03-.07)
				No. 2	.008-.020 (.2-.4)	.0008-.0024 (.02-.06)
				No. 3	.008-.020 (.2-.4)	.0008-.0024 (.02-.06)
2000 cc	.0008-.0016 (.02-.04)	①	Press Fit	No. 1	.0098-.0177 (.25-.45)	.0024-.0039 (.06-.10)
				No. 2	.0078-.0359 (.2-.9)	.0008-.0024 (.02-.06)
				No. 3	.0078-.0359 (.2-.9)	.0008-.0024 (.02-.06)

① — Thumb press fit without rod installed

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)
1600 cc	2.244 (57)	.0008-.0028 (.02-.07)	No. 3	.002-.007 (.05-.18)	1.772 (45)	.0004-.0028 (.01-.06)	.004-.01 (.1-.25)
2000 cc	2.598 (66)	.0008-.0028 (.02-.07)	No. 3	.002-.007 (.05-.18)	2.087 (53)	.0008-.0028 (.01-.06)	.004-.01 (.1-.25)

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1600 & 2000 cc 4 CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1600 & 2000 cc	1.339 (34)	.002-.0035 (.05-.09)	....

① — Wear limit

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1600 cc	1.823 (46.3)	61.7@1.469 (27.9@37.3)	.....
2000 cc	1.869 (47.5)	61@1.59 (27.6@40.4)	.....

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Camshaft Bearing Cap	13-14 (59-73)
Camshaft Sprocket	
1600 cc	44-57 (59-78)
2000 cc	37-43 (49-58)
Cylinder Head Bolts (Cold)	
1600 cc	51-54 (69-73)
2000 cc	65-72 (89-98)
Main Bearing Caps	
1600 cc	37-39 (49-53)
2000 cc	55-61 (74-83)
Connecting Rod Caps	
1600 cc	24-25 (32-34)
2000 cc	33-34 (45-47)
Crank Pulley	
1600 cc	44-50 (59-68)
1600 cc w/Counterbalance Shaft	7.5-8.5 (10-11)
2000 cc	80-94 (108-127)
Flywheel-to-Crankshaft	94-101 (128-137)
Drive Plate-to-Crankshaft	84-90 (113-122)

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