2300 cc 4 CYLINDER

ENGINE CODING

ENGINE IDENTIFICATION

Vehicle identification and engine information is stamped on the model plate which is attached to the body at the right rear corner of the engine compartment. The fourth character of the vehicle identification number indicates engine model. 2.3 liter engine code is "B".

Application	Code
2300 cc	B

ENGINE, CYLINDER HEAD & MANIFOLDS

ENGINE

Removal & Installation – 1) Mark location of hinges and remove hood. Disconnect battery and drain cooling system. Remove air cleaner and heat stove assembly. Disconnect radiator hoses and remove radiator and shroud. Disconnect thermactor hoses at pump. Disconnect heater hoses, choke cable and accelerator linkage. Disconnect brake vacuum booster hose and vacuum amplifier.

2) Disconnect all primary and secondary ignition wiring connections as well as sensor, emission control and electrical power connections between chassis and engine. Disconnect fuel line from carburetor and vacuum hoses from engine-chassis connections. Raise vehicle and drain engine oil. Disconnect exhaust pipe from manifold and hanger on transmission.

3) Remove starting motor and bolts holding transmission to engine. Lower vehicle and support transmission with a suitable jack. Attach engine hoisting sling and remove motor mount nuts and bolts. Pull engine forward until it clears transmission shaft and lift engine from vehicle. To install, reverse removal procedure.

INTAKE MANIFOLD

Removal & Installation – Remove air cleaner and disconnect fuel line from carburetor. Disconnect distributor and crankcase ventilation hoses at intake manifold. Disconnect carburetor linkage from carburetor. Remove nuts and bolts, then remove intake manifold and carburetor as an assembly from engine. To install, reverse removal procedure while noting the following: Use a new gasket upon installation. Tighten manifold nuts and bolts, in two steps, using sequence as shown in illustration.

EXHAUST MANIFOLD

Removal & Installation – Remove air cleaner and two attaching nuts from top of exhaust manifold shroud. Remove attaching nuts from muffler inlet pipe and manifold, then remove exhaust manifold. To install, apply a light film of graphite grease on exhaust manifold and install manifold. Tighten nuts to specification in sequence shown in illustration. Tighten manifold bolts to specifications in 2 progressive steps in the sequence shown.

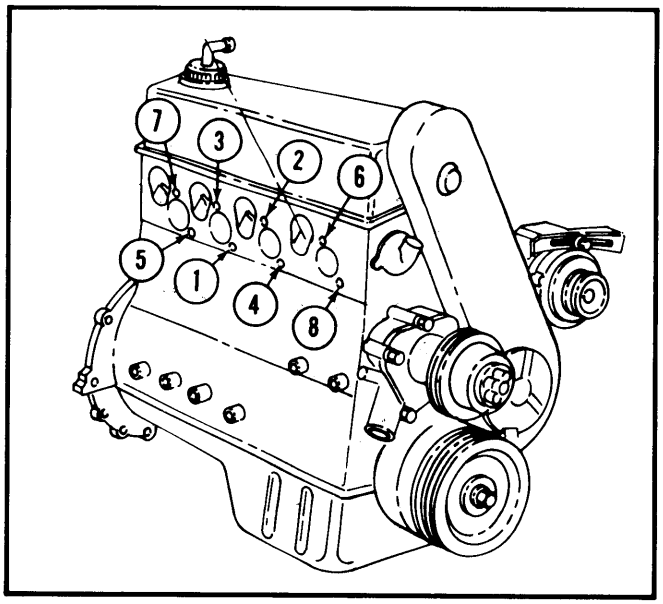

Fig. 1 Exhaust Manifold Tightening Sequence (Use Same Sequence for Tightening Intake Manifold)

CYLINDER HEAD

Removal – Drain cooling system, remove air cleaner and rocker arm cover. Remove exhaust manifold. Remove intake manifold and carburetor as an assembly. Disconnect spark plug wires from plugs. Remove all drive belts, fan, and pulley. Remove crankshaft pulley attaching bolt and crankshaft pulley. Remove camshaft drive belt cover, loosen drive belt tensioner and remove belt. Remove water outlet elbow from cylinder head. Remove timing belt inner cover-to-cylinder head attaching bolt. Remove cylinder head bolts, then remove cylinder head and camshaft as an assembly.

Installation – Clean gasket material from cylinder head and block. Install new gasket on block. Place cylinder head assembly on block and install head bolts. Tighten bolts, in two steps, using sequence shown in illustration. Reverse removal procedure for remaining components and adjust timing belt tension.

NOTE – *When installing cylinder head, ensure that locating pin at the front of the camshaft is in the 5:30 position. Valves may protrude and cause damage in any other position.*

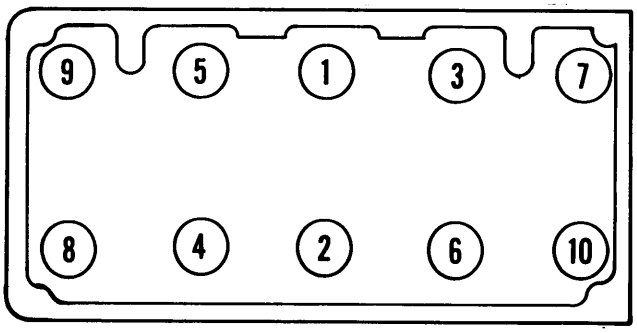

Fig. 2 Cylinder Head Tightening Sequence (Loosen in Reverse Order)

2300 cc 4 CYLINDER (Cont.)

CAMSHAFT

CAMSHAFT DRIVE BELT

Removal & Installation – *See Camshaft Timing.*

CAMSHAFT

Removal – With cylinder head removed from engine, remove rocker arms. NOTE – *Keep rocker arms in order for reinstallation in original position.* Remove camshaft sprocket attaching bolt. Slide sprocket and belt guide plate from camshaft. Remove camshaft thrust plate from rear of cylinder head and carefully slide camshaft out rear of cylinder block.

Installation – Oil camshaft with engine oil and apply Lubriplate to valve stem tips. Oil rocker arms and carefully install camshaft in cylinder head. Install thrust plate, bolts and tighten. Check camshaft endplay and replace thrust plate if endplay is not within specifications. NOTE – *Use new camshaft attaching bolt or use new Teflon tape on threads of old bolt.*

CAMSHAFT BEARINGS

Removal & Installation – Use suitable tool (71P-6250A) to remove and install bearings. NOTE – *Lube hole in bearing must be aligned with oil hole in journal.*

CAMSHAFT LOBE LIFT

Measure distance between major and minor diameters of each cam lobe with a micrometer. Difference in readings is lobe lift. If readings vary or do not meet specifications, replace camshaft.

CAMSHAFT END PLAY

With camshaft drive belt cover removed, push camshaft toward rear of engine. Install dial indicator so indicator point is on camshaft sprocket attaching screw or gear hub and zero dial indicator. Using a large screwdriver between camshaft sprocket or gear and cylinder head, pull the camshaft forward and release it. Read dial indicator and if endplay is not within specifications, replace thrust plate at rear of cylinder head.

CAMSHAFT TIMING

Checking Timing – Remove access plug from belt cover and position crankshaft to TDC by aligning pointer on cover with "O" mark on crankshaft damper. CAUTION – *Turn engine in direction of normal rotation only.* Look through access hole and check that timing mark on camshaft drive sprocket is aligned with pointer on inner belt cover. Remove distributor cap and check that rotor is facing number one position on cap.

Adjusting Timing – 1) If timing is incorrect or it is necessary to remove belt, remove timing belt outer cover and loosen belt tensioner adjustment screw. Position tension adjusting tool on tension spring roll pin and release belt tensioner. Tighten adjustment screw to hold tensioner in released position. Remove crankshaft damper, belt guide and drive belt.

2) Position crankshaft sprocket and camshaft sprocket as shown in illustration. Remove distributor cap and set rotor to No. 1 firing position by turning auxiliary shaft. Install drive belt over crankshaft sprocket and then counterclockwise over auxiliary and camshaft sprockets. Align belt fore and aft on sprockets.

3) Loosen tensioner adjustment screw and allow tensioner to move against drive belt. Remove spark plugs and rotate crankshaft two complete turns in direction of normal rotation to remove slack from belt. Tighten tensioner adjustment and pivot bolts. Recheck timing mark alignment.

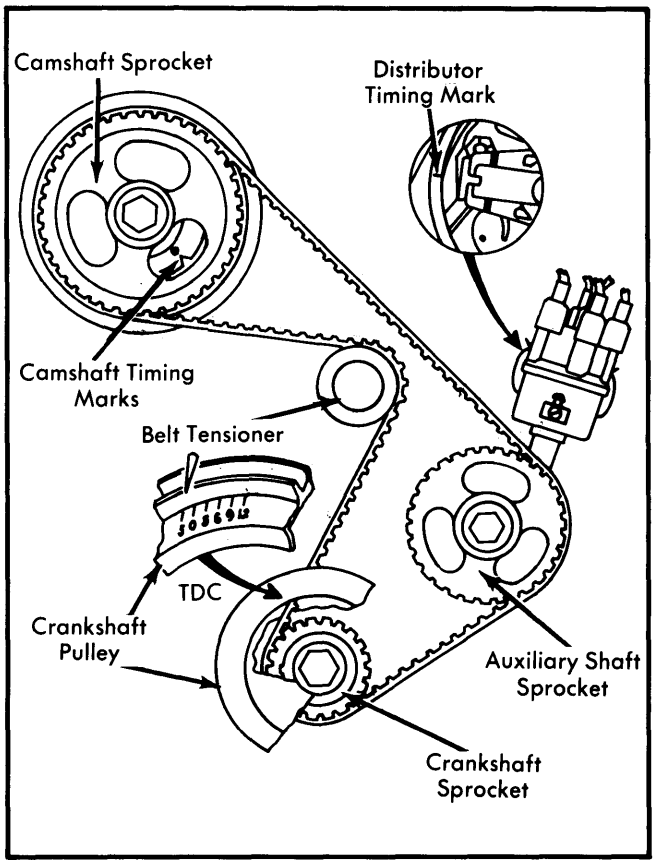

Fig. 3 Location of Timing Marks

AUXILIARY SHAFT

Removal – Remove drive belt cover, drive belt and auxiliary sprocket retaining bolt and washer. Slide sprocket from auxiliary shaft. Remove distributor, fuel pump and auxiliary shaft cover. Remove thrust plate and carefully remove shaft from cylinder block. Remove bearing from block, if worn or damaged, using suitable tool.

Installation – Align oil holes in bearing with those in block and drive bearing into place using a suitable tool. Oil shaft with engine oil and slide into cylinder block. CAUTION – *Do not allow gear and fuel pump eccentric to touch bearing surfaces during installation.* Install thrust plate, gasket and shaft cover, fuel pump, distributor and sprocket. Install and adjust drive belt. Install drive belt cover.

2300 cc 4 CYLINDER (Cont.)

VALVES

VALVE ARRANGEMENT

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

VALVE GUIDES

If valve guides become worn they may be reamed to install a new valve with oversize stem. When going from a standard size stem to oversize, always use reamers in sequence to obtain final desired bore. The valve seat must be refaced after a guide has been reamed, and a suitable tool used to break sharp corner (ID) of guide.

VALVE SPRINGS & VALVE STEM OIL SEALS

Removal – Remove rocker arm cover, and remove cam follower of valve concerned. Remove spark plug from affected cylinder and install air line and adapter. Use 140 psi line pressure to hold valve shut. Compress valve spring and remove locks (keepers). Remove retainer, spring and valve stem seal.

NOTE – *Air pressure must be kept on cylinder while springs and retainers are removed to prevent valve from falling into cylinder. If unable to maintain air pressure due to valve leakage, cylinder head must be removed and damaged valve repaired.*

Installation – Install new stem seal using plastic cap over stem. Push seal down until jacket touches valve guide, then remove plastic cover and push seal down until shoulder bottoms on valve guide. Install valve spring, retainer and locks. Lubricate all contact surfaces of cam follower and install in position. Ensure that lash adjuster has been collapsed and released before rotating camshaft.

VALVE SPRING INSTALLED HEIGHT

Measure assembled height of valve spring from surface of the spring pad to underside of spring retainer. If height is not within specifications, install .030" (.76 mm) spacer(s) between spring and pad to obtain recommended height. DO NOT install spacers unless necessary, as excess use of spacers will result in overstressing valve springs and overloading camshaft lobe.

Spring Height Specifications

Engine	Installed Height
2300 cc	1.531-1.594" (39.0-40.5 mm)

HYDRAULIC LASH ADJUSTER ASSEMBLY

Removal & Installation – With rocker arm cover removed, rotate camshaft so that cam lobe of applicable valve faces away from follower. Using suitable tool (T74P-6565-B), collapse adjuster or depress valve and slide follower out over adjuster. Lift adjuster out and inspect or clean as necessary. Replace entire assembly if plunger is not free in body. To install, reverse removal procedures.

CAUTION – *For any operation that requires removal of the rocker arm (follower), each affected lash adjuster must be collapsed after re-installation and released prior to rotating camshaft.*

HYDRAULIC LASH ADJUSTMENT

Position camshaft with lobe of valve to be checked pointing away from follower. Slowly apply pressure to follower with tool (T74P-6565-B) until adjuster is completely collapsed. Hold in this position and check clearance between follower and cam with feeler gauge. If not within specifications, check cam follower, cam, valve for sticking, and valve spring installed height.

Hydraulic Lash Adjustment

Application	①Clearance
Base of Lobe-to-Rocker Arm	
Desired	.040-.050" (1.0-1.3 mm)
Allowable	.035-.055" (.9-1.4 mm)

① – Leak down rate is 2-8 seconds.

PISTONS, PINS & RINGS

OIL PAN

Removal & Installation – Raise vehicle on hoist and remove front lower engine shield. Drain oil and remove clutch release cylinder, leaving the cylinder hanging. Remove engine rear brace attaching bolts and loosen bolts on left side. Remove oil pan bolts and lower pan from vehicle. To install, reverse removal procedure using guide pins to align pan in position. Tighten pan bolts to specifications in clockwise order, beginning with right-rear bolt.

PISTON & ROD ASSEMBLY

Removal – Remove cylinder head, oil pan and oil pump. Remove ridge at top of cylinder bores prior to removing pistons. Ensure that connecting rods and caps are marked for position and remove bearing caps. Push piston-rod assembly out of block from bottom, using caution not to nick crankshaft journals. Install rod caps on mating rods.

Installation – Oil piston rings and cylinder walls with engine oil. Install ring compressor and insert piston-rod assembly into corresponding cylinder. Notch on piston head must be toward front of engine. Tap piston into position using a wooden handle and carefully guide rod over crankshaft journal. Install rod bearing cap and tighten to specifications.

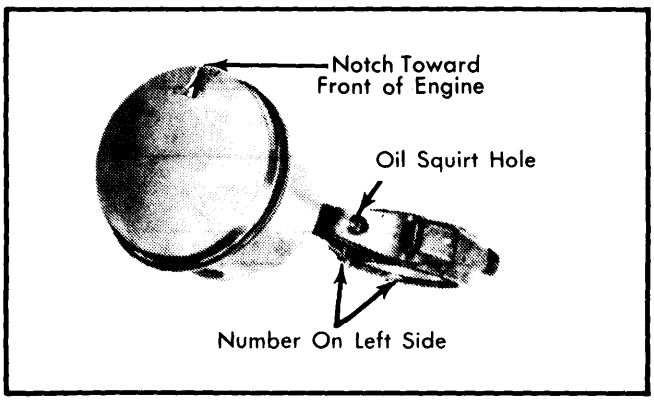

Fig. 4 Piston & Rod Assembly Identification

2300 cc 4 CYLINDER (Cont.)

FITTING PISTONS

1) Check piston to cylinder bore clearance by measuring the piston and cylinder bore diameters. Measure outer diameter of piston at centerline of piston pin bore and at 90° to pin bore axis. Measure the diameter of each cylinder bore at the top, middle and bottom, with the gauge placed at right angles and parallel to the centerline of the engine.

2) Standard size pistons are color coded; red, blue or have .003" OS stamped on the dome. Select the piston to assure the proper clearance. When the bore diameter is in the lower one third of specified range, a red piston should be used. When the bore diameter is in the middle one third a blue piston should be used. When the bore diameter is in the upper one third, the .003" OS piston should be used.

3) If no piston can be fitted, refinish the cylinder to provide proper clearance. When a piston has been fitted, mark it for assembly in the cylinder to which it has been fitted.

Piston Code	Diameter In. (mm)
Red	3.7780-3.7786 (95.961-95.976)
Blue	3.7792-3.7798 (95.991-96.006)
.003" O.S.	3.7804-3.7810 (96.022-96.037)

PISTON PINS

Removal – Remove bearing inserts from connecting rod and cap. Mark pistons and pins to assure assembly with same rod. Press piston pin from piston and connecting rod.

Installation – Apply light coat of engine oil to all parts. Assemble piston to connecting rod with oil squirt hole (in connecting rod) and notch (on piston head) positioned as shown in illustration. Start piston pin in piston and connecting rod, then press pin through piston and connecting rod until pin is centered in piston.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

NOTE – *Following procedures are with oil pan and oil pump removed. If bearing replacement is required, both halves must be replaced. Do not use a new bearing in combination with a used bearing.*

Connecting Rod Bearings – After ensuring rod caps are marked for cylinder identification, remove rod caps. Use Plastigage method to check for proper bearing clearance. If not within specifications, new bearings must be installed. New bearings are available in .001" (.025 mm) and .002" (.051 mm) undersizes. Selective fitting is required on each connecting rod. A standard bearing may be used in combination with either undersize bearing. Coat bearing surfaces with oil, install bearing and cap and tighten nuts to specifications.

Main Bearings – 1) Position jack under counterweight adjoining bearing being checked so weight of crankshaft will not compress Plastigage and provide an erroneous reading. With all bearing caps (other than one being checked) tight, check clearances using Plastigage method.

2) If clearances are excessive, a .001" (.025 mm) or .002" (.051 mm) undersize bearing may be used in combination with a standard bearing. If .002" (.051 mm) undersize bearings are used on more than one journal, they must be positioned in cylinder block rather than bearing cap. If standard and undersize bearings do not bring clearance within specified limits, crankshaft will have to be refinished and fitted with undersize bearings.

3) Remove all upper main bearings by inserting suitable tool in oil hole of crankshaft journal and rotating crankshaft clockwise to roll bearing from engine. Oil new upper bearing and insert plain (unnotched) end between crankshaft and indented (or notched) side of block. Rotate bearing into place. Install all main bearing caps with arrows pointing to front of engine.

REAR MAIN BEARING OIL SEAL

Removal & Installation – 1) Split lip type seal is provided for service replacement. Remove oil pan and oil pump. Loosen all main bearing cap bolts, allowing crankshaft to drop (not more than 1/32") and remove rear main bearing cap. Remove oil seal from cap and clean oil seal groove. Remove upper seal half from block using seal removal tool or small metal screw in end of seal. CAUTION – *Extreme care should be taken not to scratch or mar crankshaft seal surface.*

2) Dip new split lip type seal halves in clean engine oil. Carefully install upper seal into its groove with undercut side of seal toward front of engine, by rotating it on seal journal of crankshaft until ends of seal are flush with block. Ensure that no rubber has been shaved from outside of seal.

3) Install lower seal in rear bearing cap with locating tab to rear. Seal ends should be flush with bearing cap. Apply 1/16" bead of suitable sealer to bearing cap mating surfaces, using care that sealer does NOT contact seals. Install bearing cap and tighten bolts to specifications.

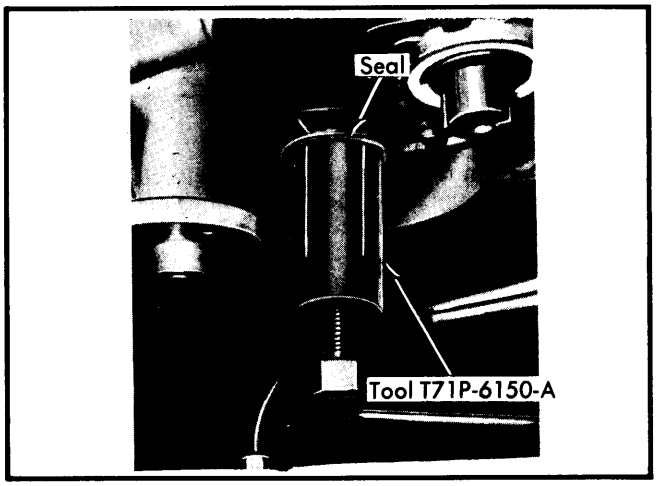

Fig. 5 Replacing Crankshaft Front Oil Seal

CRANKSHAFT FRONT OIL SEAL REPLACEMENT

Removal & Installation – Remove alternator drive belt and crankshaft pulley. Remove camshaft drive belt. *See Camshaft Drive Belt Replacement.* Slide camshaft drive belt sprocket and

2300 cc 4 CYLINDER (Cont.)

belt off crankshaft, using puller if necessary. Fit a suitable puller over end of crankshaft and remove seal. To install, use tool (T74P-6150-A) and reverse removal procedure.

NOTE – *Cylinder front cover and auxiliary shaft seals are replaced using procedure outlined above.*

ENGINE OILING

ENGINE OILING SYSTEM

Oiling system is force feed type using a full flow oil filter. Oil enters main oil gallery from oil filter and flows to main bearings and camshaft bearings. Connecting rod bearings are supplied from front and rear main bearings via inclined passages. A squirt hole in each rod bearing supplies oil to piston thrust side of cylinder. Auxiliary shaft is connected with main oil gallery. Distributor shaft receives oil from passage drilled in auxiliary shaft. Cams and cam follower arms are supplied from camshaft. Valve lash adjusters receive oil from drilled oil passages in cylinder head.

Crankcase Capacity – 4 quarts (5 quarts with filter change).

Oil Filter – Full flow, spin-on type.

Normal Oil Pressure (Hot) – 40-60 psi at 2000 RPM.

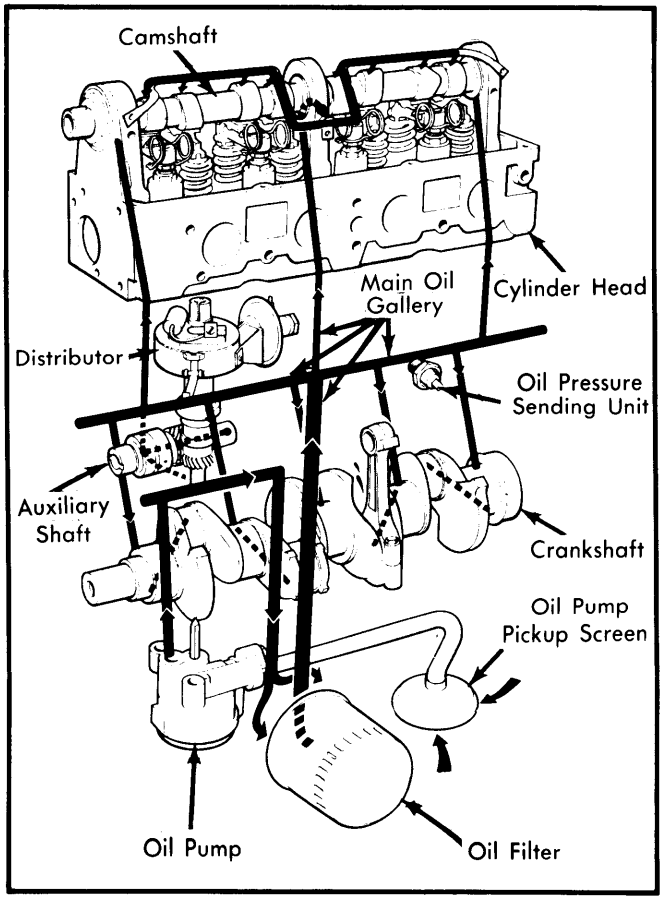

Fig. 6 Engine Oiling System

Pressure Relief Valve – Internal, non-adjustable.

OIL PUMP

Removal & Installation – With oil pan removed, remove oil pump mounting screws. Remove pump and take out oil inlet tube screws. Remove tube and gasket. Remove cover attaching screws and cover, inner rotor and shaft assembly, and pump outer race. If pump clearances are beyond limits, replace race, rotor and shaft as an assembly. To install, reverse removal procedures. Use new gaskets, prime pump with engine oil.

Oil Pump Specifications

Application	Clearance In.(mm)
Drive Shaft-to-Housing	.0015-.0029 (.04-.08)
Rotor Assembly End Clearance	.001-.004 (.02-.10)
Outer Rotor-to-Housing	.001-.013 (.02-.33)
Relief Valve Spring Tension	15.2-17.2 lbs.@1.20" (6.9-7.8 kg@30.4 mm)

ENGINE COOLING

Thermostat – Opens at 185-192°F (85-89°C). Full Open at 210-216°F (99-102°C).

Cooling System Capacity – 8.8 quarts.

Radiator Cap – 13 psi.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.(mkg)
Auxiliary Shaft Gear	28-40(3.9-5.5)
Auxiliary Shaft Thrust Plate	6-9(.8-1.2)
Belt Tensioner Pivot	28-40(3.9-5.5)
Belt Tensioner Adjuster	14-21(1.9-2.9)
Camshaft Sprocket	80-90 (11.1-12.4)
Camshaft Thrust Plate	6-9(.8-1.2)
Connecting Rod	
Step 1	25-30(3.5-4.1)
Step 2	30-36(4.1-5.0)
Crankshaft Pulley	100-120 (13.8-16.6)
Cylinder Head	
Step 1	60(8.3)
Step 2	80-90(11.1-12.4)
Exhaust Manifold-to-Cylinder Head	16-23(2.2-3.2)
Flywheel-to-Crankshaft	54-64(7.5-8.8)
Front Cover	6-9(.8-1.2)
Intake Manifold-to-Cylinder Head	14-21(1.9-2.9)
Main Bearing Cap	
Step 1	60(8.3)
Step 2	80-90(11.1-12.4)
Oil Pan-to-Block	
M6 Bolts	7-9(1.0-1.2)
M8 Bolts	11-13(1.5-1.8)
Rocker Arm Cover	4-7(.6-1.0)
Timing Belt Cover	6-9(.8-1.2)
Water Pump-to-Cylinder Block	14-21(1.9-2.9)

2300 cc 4 CYLINDER (Cont.)

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1979	140	2300	2-Bbl.	.....	.....	8.4:1	3.78	96.01	3.126	79.40

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
2300 cc	1.824 (46.3)	71-79@1.56 (32-36@39.6)	180-198@1.16 (82-90@29.5)

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
2300 cc	1.7713-1.7720 (44.991-45.009)	① .001-.003 (.025-.076)	.2437 (6.19)

① — Endplay is .001-.007" (.025-.178 mm).

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)
2300 cc							
Intake	1.728-1.744 (43.89-44.30)	44°	45°	.060-.080 (1.52-2.03)	.3416-.3423 (8.68-8.69)	.0010-.0027 (.025-.069)	.3997 (10.15)
Exhaust	1.492-1.508 (37.90-38.30)	44°	45°	.070-.090 (1.78-2.29)	.3411-.3418 (8.66-8.68)	.0015-.0032 (.038-.081)	.3997 (10.15)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
2300 cc	.0014-.0022 (.035-.056)	.0002-.0004 (.005-.010)	①	Comp.	.010-.020 (.25-.51)	.002-.004 (.051-.102)
				Oil	.015-.055 (.38-1.40)	Snug

① — Interference Fit.

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)
2300 cc	2.3982-2.3990 (60.91-60.93)	.0008-.0015 (.020-.038)	No. 3	.004-.008 (.10-.20)	2.0464-2.0472 (51.979-51.999)	.0008-.0015 (.020-.038)	.0035-.0105 (.089-.267)