808 & B-1600 4 CYLINDER

GENERAL SPECIFICATIONS										
Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	Cu. ins.	cc					in.	mm	in.	mm
1974	96.8	1586	1x2-Bbl.	.....	.....	8.6-1	3.07	78	3.27	83

ENGINE IDENTIFICATION

Engine number is stamped on engine block directly behind dipstick. Example: NA 1128.

ENGINE REMOVAL

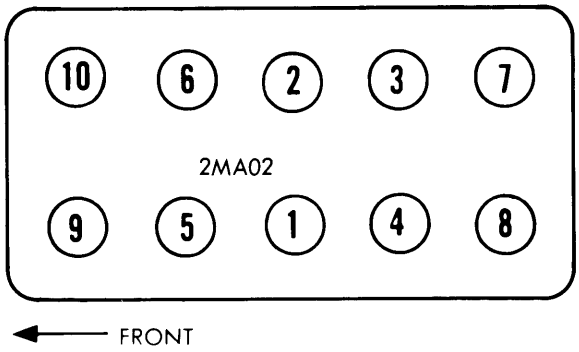
1) Drain cooling system and crankcase. Disconnect battery ground cable. Disconnect all electrical leads, water hoses, fuel lines, vacuum lines, and carburetor linkage. Remove air cleaner. Extract radiator and then withdraw cooling cowling.

2) Remove starter and disconnect exhaust pipe at manifold. Remove clutch cover and brackets. Extract nuts and bolts supporting transmission to engine. Using a suitable jack support transmission.

3) Remove both motor mounts. Attach a suitable hoist to engine and take up weight. Pull engine forward until clutch is cleared and lift engine from vehicle. To install engine, reverse removal procedure.

CYLINDER HEAD & CAMSHAFT

Removal & Installation – Remove rocker arm cover and oil seals. Remove lock nut and washer and slide distributor drive gear off camshaft. Using suitable tool (49-0164-631-A), loosen camshaft sprocket lock nut. Gradually loosen cylinder head bolts in reverse order of tightening sequence. Remove rocker arm assembly. Pull camshaft rearward removing it from camshaft sprocket. To install cylinder head and camshaft, reverse removal procedure and tighten all nuts and bolts.



CYLINDER HEAD TIGHTENING SEQUENCE

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)
1586 cc							
Int.	1.6497-1.6575 (41.9-42.1)	45°	45°	.055 (1.4)	.3162-.3168 (8.030-8.045)	.0007-.0021 (.018-.053)	...
Exh.	1.2953-1.3031 (32.9-33.1)	45°	45°	.055 (1.4)	.3160-.3168 (8.025-8.045)	.0007-.0023 (.018-.058)	...

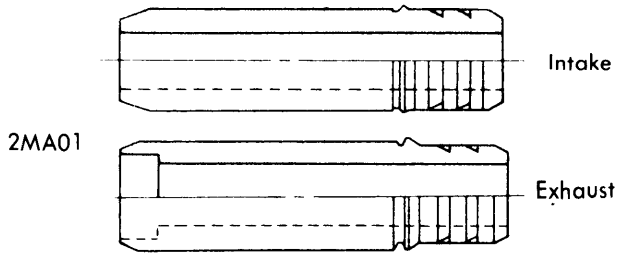
VALVE ARRANGEMENT

Right Side – All Intake.
Left Side – All Exhaust.

VALVE GUIDE SERVICING

Remove worn valve guide, using suitable tool (49-0221-251A) and hammer. Install new guide, using same tool, until ring on guide just touches cylinder head. Install new valve seal onto valve guide using suitable seal pusher (42-0223-160A).

NOTE – Intake and exhaust valve guides are different. See illustration.



VALVE GUIDES

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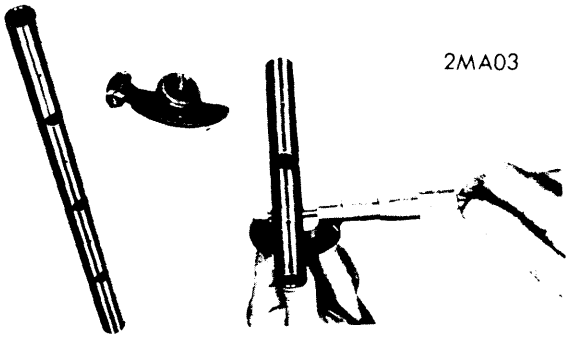
808 & B-1600 4 CYLINDER (Cont.)

VALVE SPRING REMOVAL

Remove all carbon from inside combustion chamber. Using suitable tools (49-0636-100 & 49-0221-222A), compress valve springs and remove taper sleeves, upper spring seat, valve springs and lower spring seat. If necessary, valve can now be removed. *NOTE — Mark components for reinstallation, as they are disassembled.*

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1586 cc			
Inner	1.449 (36.8)	1.26 @ 20.9 (32.0 @ 9.5)	.....
Outer	1.469 (37.3)	1.33 @ 31.4 (34.0 @ 14.25)	.....



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INSPECTING ROCKER ARM & SHAFT

VALVE SPRING INSTALLED HEIGHT

With valve springs removed, inspect for corrosion or damage and replace as necessary. Using suitable valve spring tester, measure free length and fitting pressure.

ROCKER ARM ASSEMBLY

1) With rocker arm assembly removed and disassembled, inspect all components for wear or damage. The standard clearance between rocker arm bore and shaft is .0011-.0032" (.028-.081 mm). If measured clearance is beyond .004" (.102 mm), replace rocker arm or shaft.

2) Reassemble and install rocker shaft, noting the following: Intake and exhaust rocker arm shaft supports are interchangeable; intake side uses two rocker shafts; on intake side, longer distance between oil hole and shaft end face each other. Before tightening cylinder head bolts, offset each exhaust rocker arm .040" (1.016 mm) from valve stem center.

VALVE CLEARANCE ADJUSTMENT

To adjust clearance, loosen lock nut and insert feeler gauge between rocker arm and valve stem. Turn adjusting screw until proper clearance is obtained.

NOTE — Before adjusting, ensure flat surface of ball on rocker arm is facing downward.

Valve Clearance Specifications

Application	Intake In. (mm)	Exhaust In. (mm)
Valve Side	.012 (.30)	.012 (.30)
Camshaft Side	.009 (.22)	.009 (.22)

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)
1586 cc	.0022-.0028 (.057-.072)	−.0006 to +.0002" (−.014 to +.005)	.0004-.0012 (.01-.03)	No. 1	.008-.016 (.2-.4)	.0014-.0028 (.035-.070)
				No. 2	.008-.016 (.2-.4)	.0012-.0025 (.030-.064)
				No. 3	.008-.016 (.2-.4)	.0012-.0025 (.030-.064)

OIL PAN REMOVAL

NOTE — Manufacturer recommends removing engine before attempting to take off oil pan.

Invert engine and withdraw oil pan mounting bolts. Scrape contact surfaces clean before installing new gasket and oil pan.

PISTON & ROD ASSEMBLY

1) To remove piston and rod assembly, extract bolts from connecting rod and withdraw bearing caps. Using a wooden hammer handle, force piston and connecting rod assembly out top of cylinder block.

2) To install assembly, reverse removal procedure, noting the following: Place piston rings approximately 120° apart (gap not on thrust side nor piston pin side). Ensure piston and connecting rod assembly is inserted through top of cylinder, with index mark "F" facing front of engine.

PISTON PIN REPLACEMENT

1) Remove piston pin circlips. Using suitable tool (49-0223-061), extract piston pin. If pin is hard to remove, heat piston.

2) Check fit of piston pin in connecting rod bushing. Fit should be .0004-.0012". If tolerance is exceeded, replace bushing.

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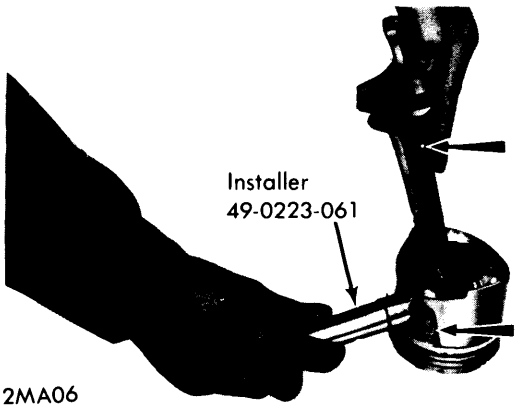
3) To replace connecting rod bushing, press out worn bushing and install new one; ensure connecting rod and bushing oil holes align. Using suitable tool, finish ream new bushing. Correct fit is hand push, light resistance.

4) Begin reassembly by replacing piston pin circlip. Place connecting rod in piston so oil hole on connecting rod and piston index mark "F" are in relation. See illustration. Using suitable tool (49-0223-061), seat piston pin. Install second circlip.

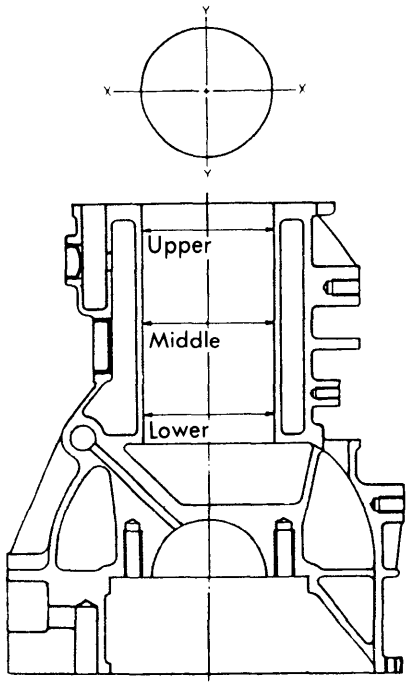


INSTALLING PISTON PIN

FITTING PISTONS

1) Standard pistons and cylinders are graded into three classes according to diameter of piston and cylinder bore. Each is stamped with "A", "C", or is unmarked. Standard clearance is obtained by combining piston and cylinder which have same marks.

2) Using a suitable gauge cylinder bore can be measured. Measurement must be taken at three depths and four angles. See illustration. Difference between maximum and minimum values is regarded as actual wear. If cylinder bore is worn .006" or more, it must be honed or rebored. If reboring is necessary, oversize pistons and rings are available. Oversizes are .010", .020", .030", & .040".

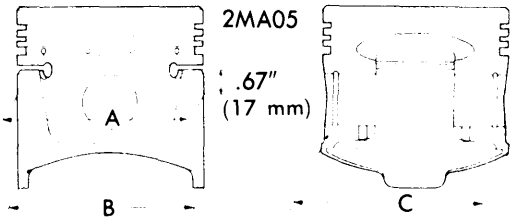


MEASURING CYLINDER BORE

3) Carefully inspect pistons and replace those severely damaged due to scoring, scratching or burning. If necessary, a micrometer can be used to measure piston at points illustrated below.

Standard Piston Specifications

Grade	Diameter In. (mm)
A	3.068-3.0691 (77.950-77.955)
No Mark	3.0685-3.0689 (77.939-77.950)
C	3.0683-3.0685 (77.935-77.939)



MEASURING PISTON

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)
1586 cc							
Brn.	2.4822-2.4824 (62.055-63.053)	.0012-.0024 (.031-.061)	No. 5	.003-.009 (.08-.24)	2.0884-2.0890 (53.045-53.061)	.0011-.0030 (.028-.076)	.004-.008 (.102-.203)
Grn.	2.4824-2.4828 (63.053-63.063)	.0012-.0024 (.031-.064)	No. 5	.003-.009 (.08-.24)	2.0884-2.0890 (53.045-53.061)	.0011-.0030 (.028-.076)	.004-.008 (.102-.203)

MAIN BEARING SERVICING

1) Remove engine and oil pan. Check main and connecting rod bearing clearances using Plastigage method. If measured value exceeds correct clearance, bearing must be replaced.

2) Using a micrometer, measure diameter of connecting rod and main bearing journals. If wear is more than .0020" at any journal, crankshaft must be ground to fit .010", .020" or .030" undersize bearings.

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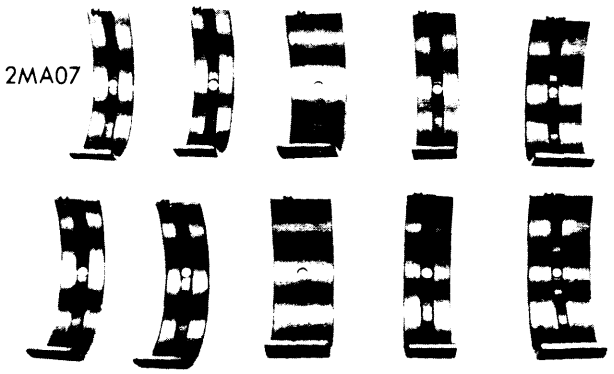
808 & B-1600 4 CYLINDER (Cont.)

NOTE — Main bearings are classified into three types according to shape. See illustration.



MAIN BEARING (SHAPE)

3) Using a dial indicator, check crankshaft for out-of-round. Maximum allowable out-of-round is .0012" (.030 mm).

4) Fit five upper main bearings to cylinder block and lower bearings to caps. Install thrust washer halves to cylinder block with oil grooved surface facing crankshaft thrust side. Fit new oil seal at rear of crankshaft. Insert side seals on both sides of rear main bearing cap. Install main bearing caps. No. 1 through No. 4 bearing caps are marked for correct installation. No.5 may or may not be indexed.

5) Insert connecting rod assembly into cylinder as previously described. Fit upper bearing to rod and over crankshaft. Fit lower bearing to rod cap and install cap. Tighten all bolts to specifications. *NOTE — Ensure engine is free to turn.*

6) End play is compensated for by thrust washers placed at No. 5 main bearing. Check crankshaft end play using a dial indicator. End play must not exceed .012", if it does thrust washers must be replaced. Thrust washers are available in .010", .020" & .030" oversizes.

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance ① In. (mm)	Lobe Lift In. (mm)
1586 cc			
Front	1.7695-1.7701 (44.945-44.961)	.0007-.0027 (.018-.069)	.....
Center	1.7691-1.7697 (44.935-44.950)	.0011-.0031 (.028-.079)	.....
Rear	1.7695-1.7701 (44.945-44.961)	.0007-.0027 (.018-.069)	.....

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

CAMSHAFT REMOVAL

1) Remove valve cover. Remove lock nut and washer, and slide distributor drive gear from camshaft. Install suitable tool to retain ring gear. Using suitable tool (49-0164-631-A), remove lock nut from sprocket.

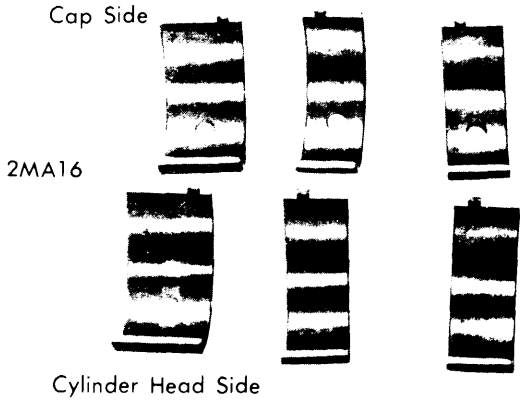
2) Remove the bolt that attaches timing chain cover to cylinder head. Remove cylinder head bolts in reverse of tightening sequence. Lift out rocker arm assembly. Pull camshaft rearward and remove sprocket. Carefully remove camshaft. If necessary camshaft bearings can be removed at this time.

CAMSHAFT BEARING REPLACEMENT

1) Inspect cam face and journals, ensuring they are not worn or scored. Using a micrometer, measure cam height. Standard cam height is: intake 1.7605" (44.715 mm) and exhaust 1.7592" (44.682 mm). If measured value differs from standard specification by more than .008" (.20 mm), replace camshaft.

2) Measure diameter of camshaft bearing journals. If wear is more than .002" (.051 mm) above maximum standard diameter, camshaft must be ground to accept .010", .020" or .030" undersize bearings.

3) Inspect camshaft bearing clearances using Plastigage method. If standard clearances are exceeded, replace bearings. If new bearings are properly fitted, correct clearance will be obtained without filing, shimming or scraping. Camshaft bearings are classified into two types as shown in illustration.



CAMSHAFT BEARING TYPES

4) Using a dial indicator, check camshaft out-of-round. Camshaft must not exceed .0012" (.030 mm) out-of-round.

5) Check camshaft end play using a feeler gauge. Standard clearance is .001-.007" (.025-.178 mm). If standard value is exceeded by more than .008" (.203 mm), replace thrust plate.

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
808	15°	55°	58°	12°
B-1600	13°	54°	57°	10°

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808 & B-1600 4 CYLINDER (Cont.)

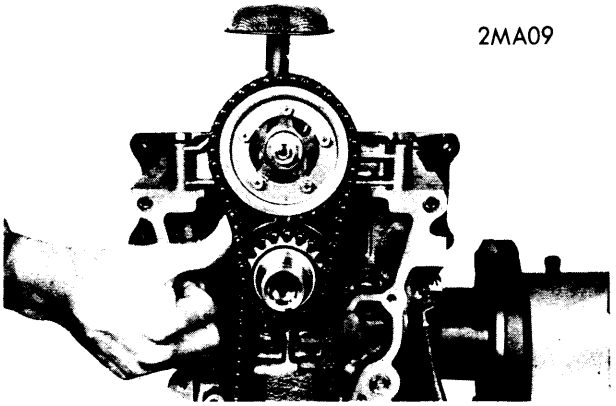
TIMING CHAIN REPLACEMENT

1) With engine removed, extract crankshaft pulley. Invert cylinder block and remove oil pan. Remove timing chain cover and gaskets. Remove oil deflector from crankshaft. Remove chain tensioner (chain tensioner can be further disassembled), slipper blade, and chain damper.

2) Remove lock nut and washer from oil pump sprocket. Pull off oil pump and crankshaft sprocket together with oil pump drive chain. Remove crankshaft spacer, sprocket and timing chain. Remove key and spacer from crankshaft.

3) To install, fit spacer onto crankshaft. Place timing chain on crankshaft and camshaft sprockets with index marks aligned. Align crankshaft and its sprocket keyway and fit sprocket onto crankshaft. Install spacer on crankshaft. Position chain tensioner, slipper blade, and damper.

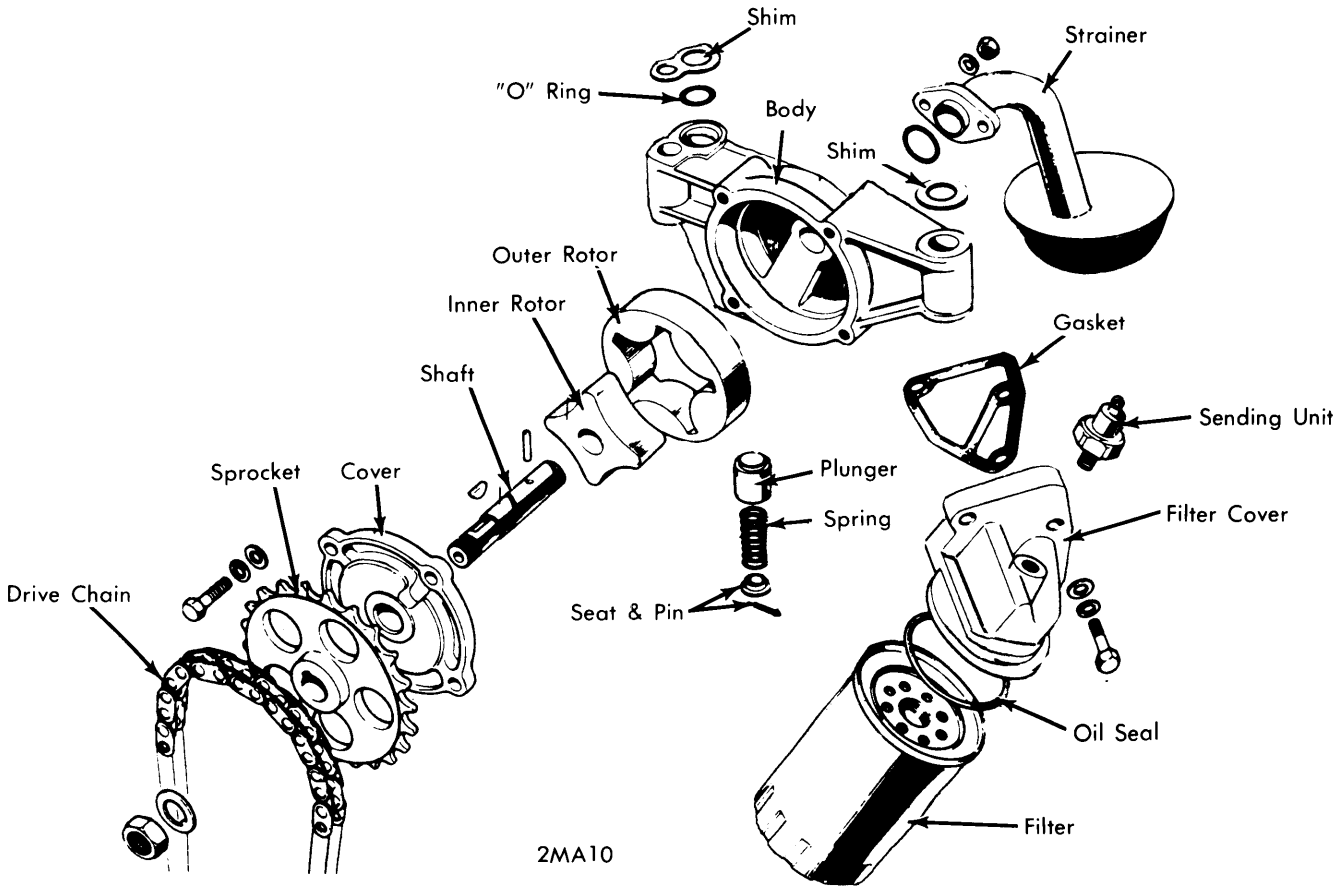
4) Fit key on oil pump shaft. Install oil pump drive chain to crankshaft sprocket and install them to crankshaft and oil pump shaft. Tighten oil pump shaft nut and check oil pump chain slack, using fingers as shown in illustration. Slack should be approximately .160". If slack exceeds standard specification, remove oil pump and add shims between cylinder block and oil pump. Tighten lock nut to specifications.



CHECKING OIL PUMP CHAIN SLACK

5) Install oil deflector in position and oil seal into timing chain cover. Install timing chain cover with new gasket.

ENGINE OILING



OIL PUMP ASSEMBLY

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808 & B-1600 4 CYLINDER (Cont.)

ENGINE OILING (Cont.)

ENGINE OILING SYSTEM

Oil is circulated under pressure by a rotor type pump. The pump is mounted on cylinder block inside the oil pan and is driven by crankshaft.

Crankcase Capacity – Approximately 3.8 quarts.

Oil Pressure – 50-64 psi (3.5-4.5 kg/cm²) @ 3000 RPM.

Oil Filter – Full-flow disposable canister type.

Pressure Regulator Valve – Nonadjustable.

OIL PUMP

1) Check clearance between lobes of rotors with a feeler gauge. If clearance exceeds .010", replace both rotors.

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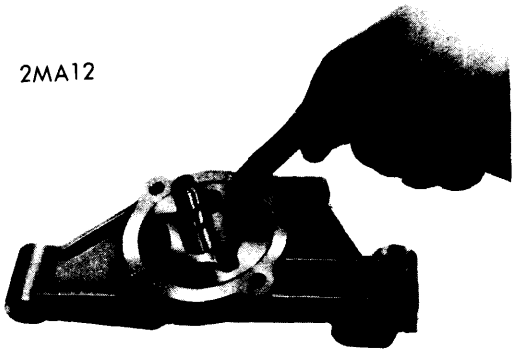

CLEARANCE BETWEEN ROTORS

2) Inspect clearance between outer rotor and pump body, using a feeler gauge. Maximum clearance is .012".

Oil Pump Specifications

Application	Clearance In. (mm)
Rotor-to-Rotor	.002-.006 (.051-.152)
Rotor-to-Body	.006-.010 (.152-.254)
End Play	.002-.004 (.051-.102)

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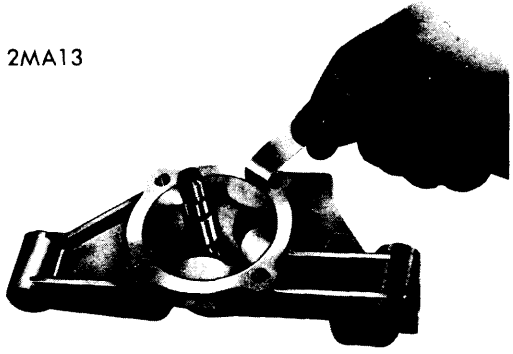
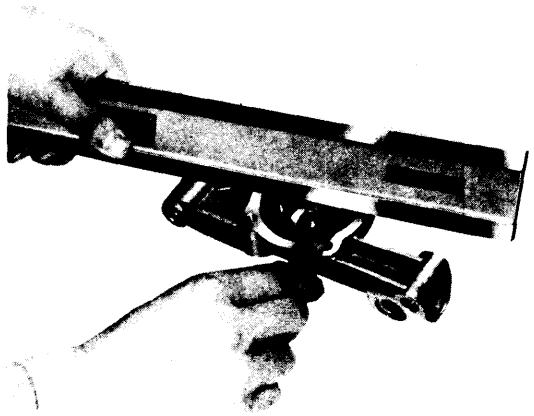


ROTOR-TO-BODY CLEARANCE

3) To check rotor ends, place a straightedge across pump body and measure clearance between rotor and straight edge, using a feeler gauge. Then place straightedge across cover and measure clearance between straight edge and cover. If end play exceeds .006", replace pump cover.



CHECKING END PLAY

ENGINE COOLING

WATER PUMP

Remove bolts mounting fan and pulley to water pump. Remove nuts and bolts holding water pump to timing chain cover. Remove alternator bracket and water pump.

NOTE – It may be necessary to remove radiator.

Cooling System Capacity – 808 models 8.0 qts. and B1600 models 6.8 qts.

Thermostat – Begins to open at 180°F (82°C) and is fully open at 203°F (95°C).

Radiator Cap – 13 psi.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head	
Cold	56-60 (7.7-8.3)
Hot	69-72 (9.5-10.0)
Main Bearing Cap	61-65 (8.4-9.0)
Connecting Rod Cap	36-40 (5.0-5.5)
Oil Pump Sprocket	22-25 (3.0-3.5)
Camshaft Sprocket	51-58 (7.0-8.0)
Crankshaft Pulley	101-108 (14.0-14.9)
Distributor Drive Gear	51-58 (7.0-8.0)
Intake Manifold	14-19 (1.9-2.6)
Exhaust Manifold	12-17 (1.7-2.4)

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