1966-71 & 1973 250" 6 CYL. ENGINE

GENERAL SPECIFICATIONS							
Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1966-71	250"	1-Bbl.	155@4200	235@1600	8.5-1	3.87"	3.53"
1973	250"	1-Bbl.	100@3600	175@1600	8.2-1	3.87"	3.53"

► *NET HORSEPOWER & TORQUE NOTE — Horsepower and Torque figures given for 1972 and later are NET. NET Horsepower and Torque represent power at the flywheel when the engine is installed in the vehicle, with wide open throttle and all systems operating such as; air cleaner, exhaust system, water pump, generator, oil pump and air conditioning.*

ENGINE IDENTIFICATION

1966-67 — Identified by number plate on left front door pillar.

1968-71 — Identified by plate located on left upper instrument panel.

1973 — Engine code is stamped on distributor mounting pad on right side of block.

Application	Man. Trans.	Auto. Trans.
250" 1-Bbl.		
1966-67	VA,VB,VD,BC,VJ	VE,VF,VG,VH,VJ,VK
1968-70	VA,VB	VE,VF
1971	ZB	ZG
1973	CCC,CCD	CCA,CCB

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

OIL PAN REMOVAL

See Oil Pan Removal at end of ENGINE Section.

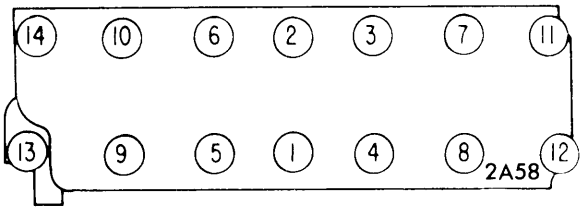
ENGINE NOTES

►*1970 PISTON & RING CHANGE:* A new piston was introduced in some 1970 models and is currently being used. This new design uses a 5/64" thick compression ring, instead of the 1/16" thick compression ring used on the first type piston. These rings are not interchangeable.

CYLINDER HEAD INSTALLATION

NOTE - Do not use sealer on composition steel-asbestos gasket.

Place gasket on block over dowel pins with bead up. Coat threads of cylinder head bolts with sealer and tighten a little at a time in sequence shown in diagram until specified torque is reached.



CYLINDER HEAD TIGHTENING SEQUENCE

TIGHTENING SPECIFICATIONS

Bolt or Nut	Ft. Lbs.
Cylinder Head	95
Manifold Clamp, Outer	20
All others	30
Exhaust Manifold to Intake Manifold	25
Oil Pan-to-Crankcase (1/4")	7
(5/16")	10
Main Bearing Caps	65
Flywheel	60
Connecting Rod Caps	35
Rocker Arm Cover	5
Engine Front Cover	7
Water Pump	15
Water Outlet	20
Oil Pump	9
Oil Pump Cover	6
Camshaft Thrust Plate	7
Flywheel Housing	30
Oil Pan Drain Plug	20
Clutch Pressure Plate	20

PISTONS, PINS, RINGS						
	PISTONS	PINS		RINGS		
Engine	①Clearance	② Piston Fit	③ Rod Fit	Rings	End Gap	②Side Clearance
250" 1966-71	.0005-.0015"	.00015-.00025"	.0008-.0016"	1 & 2 3	.010-.020" .015-.055"	.0020-.0038" .000-.005"
1973	.0005-.0015"	.00015-.00025"	.0008-.0016"	1 2 3	.010-.020" .010-.020" .015-.055"	.0012-.0027" .0012-.0032" .005"Max.

① — Wear Limit — .0025" ② — Wear Limit — .001" ③ — Interference fit.

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1966-71 & 1973 250" 6 CYL. ENGINE (Cont.)

FITTING PISTONS

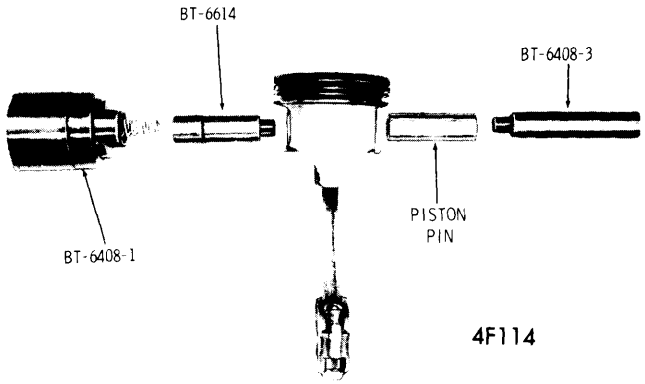
Measure cylinder bore diameter 2 1/2" from top of cylinder bore. Measure piston diameter across centerline of piston pin. Maximum acceptable clearance is .0025" (used or new piston in worn cylinder bore). Oversize pistons are available in .001" and .030" oversize.

PISTON PINS

Piston and piston pin are a matched set and are not serviced separately. Measure diameter of piston pin with a micrometer and measure piston pin bore in piston with a dial bore gauge or inside micrometer. If clearance is in excess of the .001" wear limit, the piston and pin should be replaced.

Removal – Place piston on suitable support. Using a pilot tool as a driver, use arbor press to press pin from piston and rod.

Installation – Assemble rod to piston (alignment of rod in relation to notch on piston head not important) and place piston on suitable support. Using a pilot tool and an arbor press (see illustration), press pin into piston and rod assembly. Check piston for freedom of movement on pin.



PISTON PIN ASSEMBLY

PISTON & ROD INSTALLATION

Notch in piston head toward front of engine. Oil squirt hole in rod toward camshaft (bearing tang slots must face away from center of engine).

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	① Journal Diam.	② Clearance	Thrust Bearing	Crankshaft Endplay	① Journal Diam.	Clearance	Sideplay
250" 1966-71	2.2983-2.2993"	.004"	No. 7	.002-.006"	1.999-2.000"	.004"Max.	.009-.014"
1973	2.2983-2.2993"	.0035"	No. 7	.002-.006"	1.999-2.000"	.0035"Max.	.009-.014"

① – Out-of-round & taper limit .001". ② – No. 1 bearing .002" Max.

REAR MAIN BEARING OIL SEAL

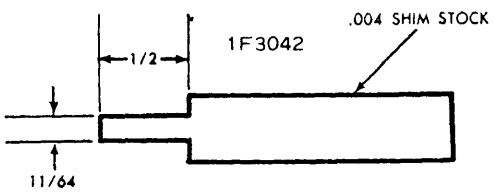
NOTE – Replace upper and lower seal halves as a unit. Install seal with lip facing front of engine. With the rear main bearing cap removed, proceed as follows:

1) Remove oil seal from bearing cap. Use a small brass drift punch to tap upper seal until the end protrudes far enough to be removed with pliers.

2) To replace upper seal, fabricate a tool from .004" shim stock (see illustration). Position tool between crankshaft and seal seat, then position seal between crankshaft and tip of tool so that seal bead contacts tip of tool.

3) Roll seal around crankshaft using tool as a "shoehorn" to protect seal bead from sharp corner of seal seat surface. Remove tool, being careful not to remove seal.

4) Install lower seal in bearing cap, using tool as a "shoehorn". Feed seal into cap using light pressure with thumb and finger. Apply sealant to bearing cap interface, being careful to keep sealant off seal split line. Install bearing cap and torque to specification.



REAR MAIN SEAL INSTALLING TOOL

VIBRATION DAMPER

Removal - Remove radiator and belt. Remove damper with suitable puller (use tapped holes in damper face).

Installation - Coat front cover oil seal contact area of damper with engine oil. Position damper on crankshaft and use driving tool and mallet until damper bottoms against crankshaft gear.

TIMING GEAR COVER

NOTE – Following procedure is for removing and replacing cover without removing oil pan.

Removal – Remove torsional damper, two front oil pan screws and cover attaching screws. Pry top part of cover forward far enough to insert a knife between block and cover. Cut oil pan front cover seal flush with block on both sides and remove cover.

Installation – Cut tabs from new oil pan front seal so seal will fit oil pan properly. Apply gasket sealer to seal and install seal on front cover pressing tips into holes provided in cover. Apply a 1/8" bead of silicone rubber sealer to joint formed at oil pan and cylinder block. Install suitable front cover centering tool (J-23042), to cover. Install front cover to block and partially tighten two oil pan screws-to-cover. Install cover screws, remove centering tool and tighten all screws.

FRONT OIL SEAL INSTALLATION

Seal can be replaced with front cover installed. Remove vibration damper. Pry oil seal out of front cover using suitable tool. Install new seal with lip toward inside of cover and drive into position.

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1966-71 & 1973 250" 6 CYL. ENGINE (Cont.)

ROCKER ARM STUD REPLACEMENT

Studs with damaged threads may be replaced with standard studs. Loose studs must be replaced with oversize studs. To remove stud, stack washers on stud and screw nut down on washers until stud pulls out of head. Ream holes to proper size for installation of oversize studs. Size is marked on bottom of oversize studs (A1 – .001" oversize, A3 – .003" oversize, A13 – .013" oversize).

NOTE – Coat new studs with hypoid axle lubricant before installing and do not attempt to install oversize studs without reaming stud holes.

VALVES

Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
Intake	1.715-1.725"	45°	46°	1/32-1/16"	.3410-.3417"	.0010-.0027"	.388"
Exhaust	1.495-1.505"	45°	46°	1/16-3/32"	.3410-.3417"	.0015-.0032"	.388"

VALVE ARRANGEMENT

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

VALVE GUIDES

Integral with cylinder head. For oversize valve stem, ream to .003", .015", or .030" oversize.

VALVE STEM OIL SEALS

"O" ring type used on all valves. Installed on lowest groove on upper part of stem below locks and against cap.

VALVE SPRINGS

Engine	Pressure (Lbs.) Valve Closed	Pressure (Lbs.) Valve Open	Free Length
All	56-64 at 1.66"	180-192 at 1.27"	1.90"

VALVE SPRING INSTALLED HEIGHT

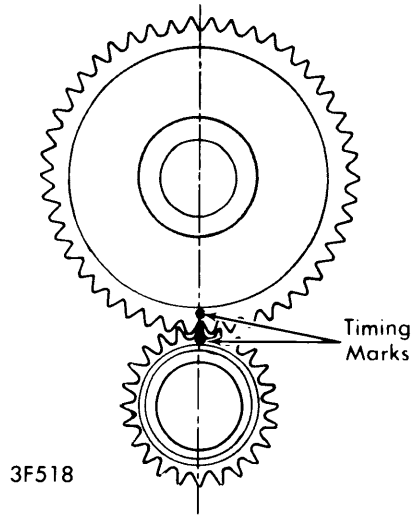
Installed height of valve spring should be 1 21/32", ± 1/32". Measure from top of spring seat in head to top of spring or spring shield. If measurement exceeds specification, install 1/16" spring seat shim. Do not shim to obtain a height under the minimum specified.

TIMING GEAR SERVICE

Gears are press fit on camshaft and crankshaft. Use suitable tools for removal and installation.

Camshaft Gear Removal – With camshaft removed from engine, use arbor press to press shaft from gear. *CAUTION – Thrust plate must be positioned so Woodruff key in shaft does not damage thrust plate when shaft is pressed from gear.*

Camshaft Gear Installation - Support shaft directly back of front bearing journal and install gear spacer ring and thrust plate. Install woodruff key in shaft keyway. Press camshaft gear onto shaft until it bottoms against gear spacer ring. End clearance of thrust plate should be .001-.005". Install camshaft assembly in block. Turn crankshaft and camshaft so the timing marks on gear teeth will line up, then push camshaft into position. Install camshaft thrust plate-to-block screws and tighten to specifications. Gear runout should not exceed .004" (camshaft), .003" (crankshaft). Backlash between timing gear teeth should be .004-.006".



VALVE TIMING MARKS

CAMSHAFT

Engine	Journal Diam.	Clearance	Endplay	Cam Lobe Lift
All	1.8687-1.8692"	.0015-.003"	.001-.005"	.2217"

CAMSHAFT REMOVAL & INSTALLATION

Drain crankcase and radiator. Remove radiator, fan, water pump assembly, and grille assembly. Remove rocker arm cover, loosen valve rocker arm nuts and pivot rocker arms clear of pushrods. Remove the distributor, and the fuel pump. Remove the coil, pushrod covers and gasket, pushrods, and valve lifters. Remove spark plugs. Remove vibration damper and loosen oil pan bolts, allowing oil pan to drop away from front cover. Remove front cover. Remove two camshaft thrust plate screws, working through holes in camshaft gear. Remove camshaft and gear assembly by pulling it out through front of block. *CAUTION - Support shaft to prevent bearing damage.*

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1966-71 & 1973 250" 6 CYL. ENGINE (Cont.)

Installation - Reverse removal proceuure and note the following: To reinstall distributor, turn crankshaft to firing position of No. 1 cylinder (No. 1 exhaust and intake valve lifters both on base circle of camshaft and timing mark on damper indexed with top dead center mark on timing pad). Install distributor with new gasket so vacuum diaphragm faces front of engine and rotor arm points toward No. 1 cylinder spark plug contact. Turn oil pump drive shaft so it indexes with distributor shaft.

HYDRAULIC LIFTER SERVICE

Two types of lifters are used. They are interchangeable as complete assemblies, but their parts are not interchangeable. Type **A** has a groove near its base. Type **B** uses an inertia valve and retainer which should not be removed from the push rod seat. To check Type **B,** shake the push rod seat and inertia valve assembly; valve should move. Lifters are serviced as assemblies. *CAUTION – Do not pump lifter assembly during leakdown test.*

HYDRAULIC LIFTER ADJUSTMENT

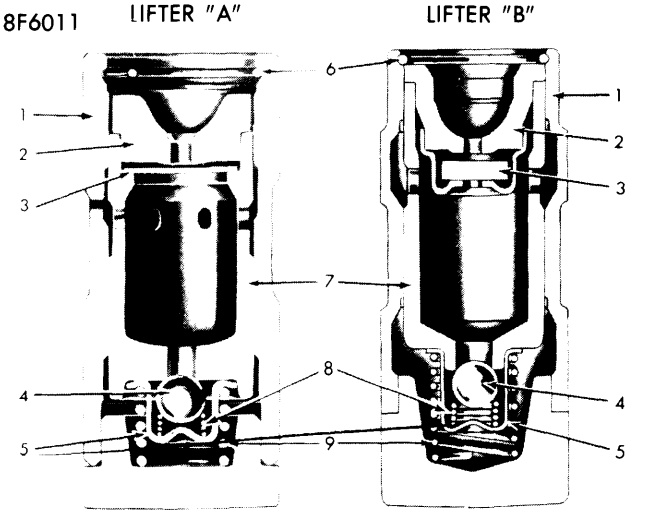
Rotate engine until rotor is at No. 1 cylinder position and points are just open. Adjust the following valves:

Intake – 1, 2, 4. **Exhaust** – 1, 3, 5.

Back out rocker arm adjusting nut until lash is felt at push rod, then turn in nut until all lash is removed. After all lash has been removed, turn adjusting nut in one full additional turn.

Rotate engine until rotor is at No. 6 cylinder position and points are just open. Adjust the following valves:

Intake – 3, 5, 6. **Exhaust** – 2, 4, 6.



1 Lifter Body
2 Push Rod Seat
3 Metering Valve (Lifter A)
Inertia Valve (Lifter B)
4 Check Ball
5 Check Ball Retainer
6 Push Rod Seat Retainer
7 Plunger
8 Check Ball Spring
9 Plunger Spring

VALVE LIFTER ASSEMBLIES

ENGINE OILING

Crankcase Capacity - 4 qts. (5 qts. with filter change).

Oil Filter Replacement - Change filter with first oil change (6,000 miles) and every second oil change thereafter (12,000 miles). To replace filter, screw it onto center stud by hand until gasket contacts filter base, then tighten an additional 2/3 turn. Do not overtighten.

Oil Pressure – 30-45 lbs. at 1500-2000 RPM.

Pressure Regulator Valve - In oil pump body. Not adjustable.

ENGINE OILING SYSTEM

Oil under pressure is directed from the oil pump to the full-flow oil filter. In case a filter becomes clogged and restricts the full-flow of oil, a by-pass valve is located in the filter mounting base. From the oil filter, oil flow is directed as follows:

Crankshaft and Camshaft Bearings - Each main and camshaft bearing is fed oil by a passage extending through crankcase from main oil gallery.

Connecting Rods & Pistons - Oil is delivered from each main bearing to adjacent connecting rod bearing through drilled passages in crankshaft. A hole in connecting rod sprays oil onto cylinder walls for piston and pin lubrication when holes in rod and journal index. Oil hole in rod is toward camshaft side of engine.

Valve Lifters - Main oil gallery intersects lifter bores, and lifters are supplied with oil directly from gallery. Lifter has metering valve directly below hole in pushrod seat to permit oil to pass into hollow pushrod.

Rocker Arms & Valve Stems - Oil passes up through hollow pushrods to a hole in upper end of pushrods that matches hole in rocker arm. Oil from this hole fills rocker arm, and overflow lubricates valve stem tip. Oil in rocker arm chamber drains down through pushrod holes to valve lifter chamber, then returns to crankcase through drain holes.

Timing Gears - Lubricated by oil flow from nozzle pressed in front face of block above crankshaft gear. Oil is fed to nozzle through cross-passage from front camshaft bearing.

Distributor Drive Gear - Lubricated by oil drainage from valve lifter compartment (drain hole directs oil onto gears).

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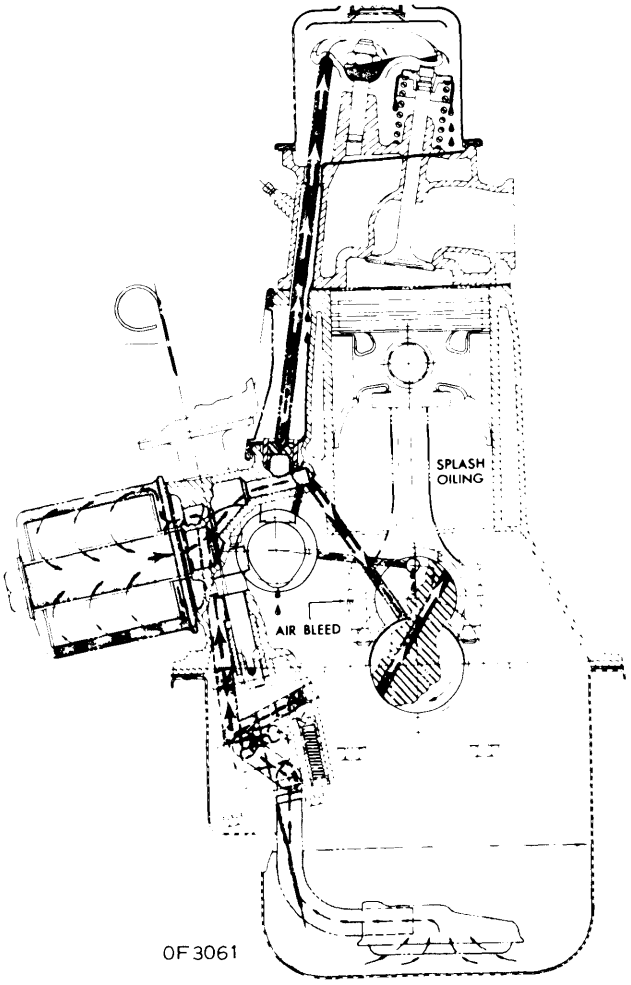
ENGINE OILING (Cont.)



ENGINE OILING SYSTEM

OIL PUMP

Removal – Mark gears so they may be reassembled with the same teeth indexing. Do not disturb pickup screen on pipe. Screen is serviced as an assembly. *NOTE – If pump gears or body are damaged or worn, replacement of entire pump assembly is required.*

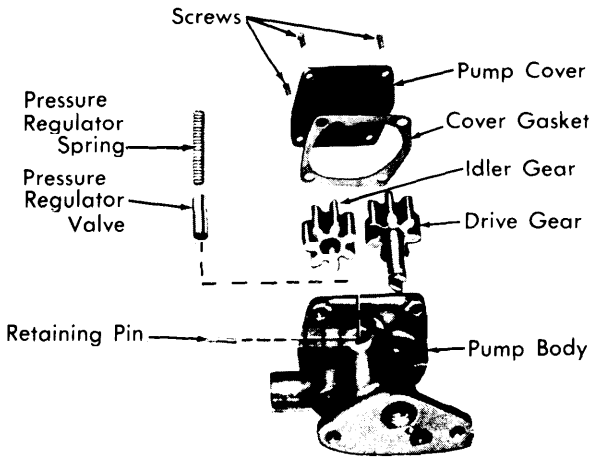
Installation – Apply sealer to end of pipe and tap into place. Install idler gear in pump body with smooth side of gear toward cover opening. *NOTE – Bottom of screen must be parallel with bottom of pan.*

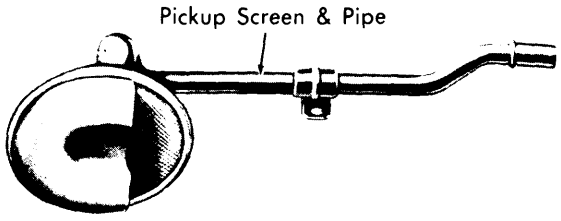
DISTRIBUTOR DRIVE SHAFT LOWER BEARING

Bushing pressed into lower side of cylinder block and serves as lower bearing for distributor shaft (inside diameter) and as pilot for oil pump shaft (outside diameter). Replace bushing when distributor shaft-to-bushing clearance exceeds .0035".

Removal - Use Tool J-9534 and slide hammer to remove bearing.

Installation - Use Tool J-9535 with driver-bolt in driver handle or other suitable tool.





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OIL PUMP ASSEMBLY

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