1970-73 250" 6 CYL. ENGINE

GENERAL SPECIFICATIONS

Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1970	250"	1-Bbl.	155@4200	235@1600	8.5-1	3.87	3.53
1971	250"	1-Bbl.	145@4200	230@1600	8.5-1	3.87	3.53
1972	250"	1-Bbl.	110@3800	185@1600	8.5-1	3.87	3.53
1973	250"	1-Bbl.	110@3800	185@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 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 pistons. These rings are **NOT** interchangeable.

ENGINE IDENTIFICATION

Engine code is stamped on distributor mounting pad.

Application	Code Letters
1970 250" 155 HP	ZB, ZG
1971 250" 145 HP	ZB, ZG, CAA, CAB
1972 250" 110 HP (NET)	W6, Y6, CBG, CBJ
① 110 HP (NET)	CBA, CBC
1973 250" 100 HP (NET)	CCC, CCD, CCA, CCB

① — Available California only, equipped with A.I.R.

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

OIL PAN REMOVAL

See Oil Pan Removal at end of ENGINE Section.

CYLINDER HEAD INSTALLATION

Coat threads of cylinder head bolts with sealing compound and install finger tight. Tighten bolts gradually (in sequence shown) to a final torque of 95 Ft. Lbs.

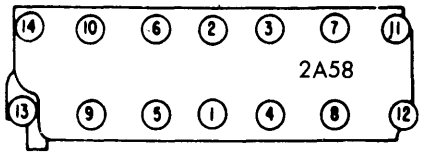
INTAKE MANIFOLD TIGHTENING

Tighten four inside manifold bolts gradually to 25-30 ft. lbs., then tighten two end bolts to 15-20 ft. lbs.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Cylinder Head	95
Spark Plugs	15
Clamp-Intake & Exhaust Manifold-to-Head	① 25-30
Main Bearing Caps	65
Connecting Rod Caps	35
Flywheel-to-Crankshaft	60
Water Pump	17
Oil Pump Cover	6
Oil Pump-to-Block	9
Fan-to-Water Pump Hub	20
Engine Front Mount-to-Block	33
Engine Rear Mount-to-Case	45
Oil Pan	7

① — Bolt at each end 15-20 ft. lbs.



CYLINDER HEAD TIGHTENING SEQUENCE (6 CYLINDER)

PISTONS, PINS, RINGS

Engine	PISTONS ①Clearance	PINS ② Piston Fit	PINS Rod Fit	RINGS Rings	RINGS End Gap	RINGS ③ Side Clearance
250"	.0005-.0015"	.00015-.00025"	Press Fit	Top 2nd Oil	.010-.020" .010-.020" .015-.055"	.0012-.0027" .0012-.0032" .005" Max.

① — Wear Limit — .0025"

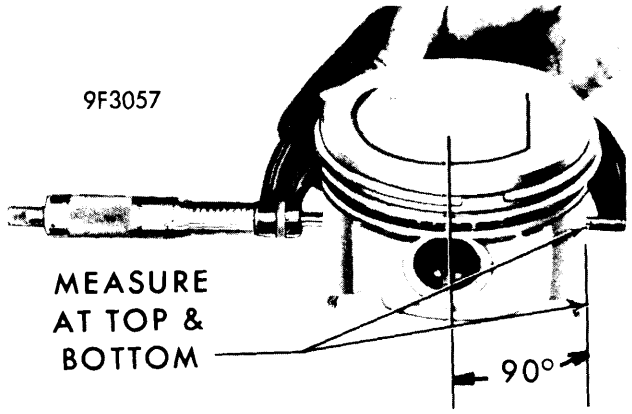
② — Wear Limit — .001"

③ — Wear Limit — .001"

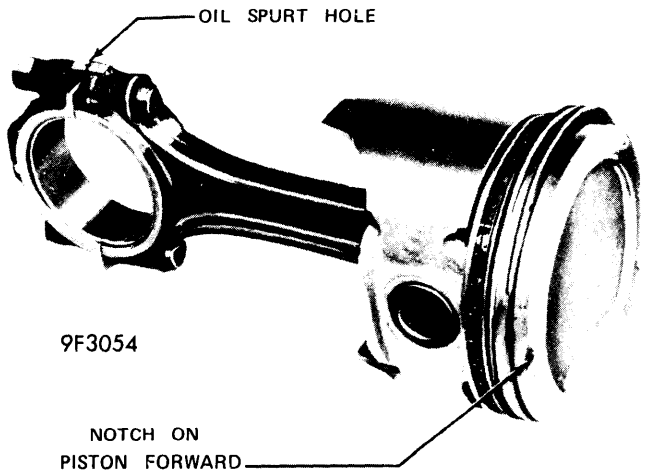
1970-73 250" 6 CYL. ENGINE (Cont.)

FITTING PISTONS

Measure bore at its smallest diameter. Measure piston 1 9/16" from top of skirt, perpendicular to piston pin boss (pin removed).



MEASURING PISTON



PISTON AND ROD ASSEMBLY

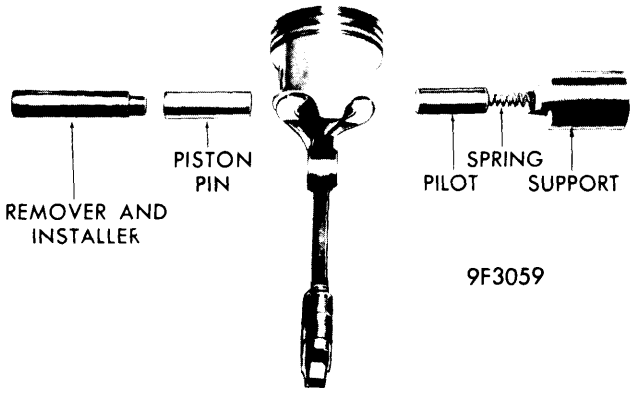
PISTON & ROD INSTALLATION

Install connecting rod guides on rod to retain upper bearing in place and protect crankshaft from scoring. Install assembly with notch in top of piston facing front of engine and oil groove facing camshaft.

PISTON PIN REPLACEMENT

Removal – Place connecting rod and piston in arbor press with piston on support Tool J-9510-1. Use remover Tool J-9510-3 to press piston pin from piston.

Installation – Using Tool J-9510 place support Tool J-9510-1 with spring and pilot Tool J-9510-2 in place on arbor press. Place piston on connecting rod with notch in piston head downward when facing oil spurt hole in rod. Place pilot through piston and rod and install Tool J-9510-3 on piston pin. Press installer until pilot bottoms on support. Check for free movement of piston on pin.



PISTON PIN INSTALLATION

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	①Sideplay
250"	2.2983-2.2993"	.0003-.0029"	No.7	.002-.006"	1.999-2.000"	.0007-.0027"	.009-.014"

① – 1970 .009-.013"

REAR MAIN OIL SEAL REPLACEMENT

Removal – Remove oil seal from groove by prying from bottom, using a small screwdriver. Seal may be removed without removing crankshaft.

Installation – Always clean crankshaft surface before installing a new seal. Upper and lower seals should be replaced as a unit. Insert a new seal well lubricated with engine oil in bearing cap groove. *NOTE – Keep oil off parting line surface, as this surface is treated with glue.* Gradually push with a hammer handle until seal is rolled into place.

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.

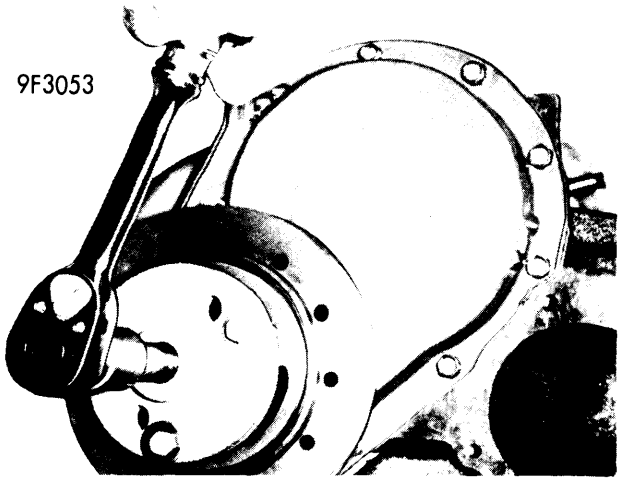
Installation – Cut tabs from new oil pan front seal so seal will fit oil pan properly. Apply gasket sealer to seal and install seal on front cover pressing tips into holes provided in cover. Apply a 1/8" bead of silicone rubber sealer to joint formed at oil pan and cylinder block. Install suitable front 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.

1970-73 250" 6 CYL. ENGINE (Cont.)

TORSIONAL DAMPER REPLACEMENT

Removal – Remove radiator, fan and water pump pulley. Install Tool J-6978 on damper and turn puller screw.

Installation – Coat damper hub seal contact area with engine oil. Attach Tool J-22197, position balancer on crankshaft and drive into position until it bottoms against crankshaft gear.



TORSIONAL DAMPER REMOVAL

FRONT OIL SEAL REPLACEMENT

NOTE – Seal can be replaced without removing timing gear cover.

Removal – With torsional damper removed, pry oil seal from cover. Do not distort cover seal recess.

Installation – Install new seal with lip toward inside of cover using suitable tool (J-23042).

VALVES

Engine & Valve		Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	① Stem Clearance	Valve Lift
250"	Int.	1.72"	45°	46°	.0313-.0625"	.3410-.3417"	.001-.0027"	.388"
	Exh.	1.50"	45°	46°	.0625-.0938"	.3410-.3417"	.0015-.0032"	.388"

① – 1970 Exh. .001-.0027".

VALVE ARRANGEMENT

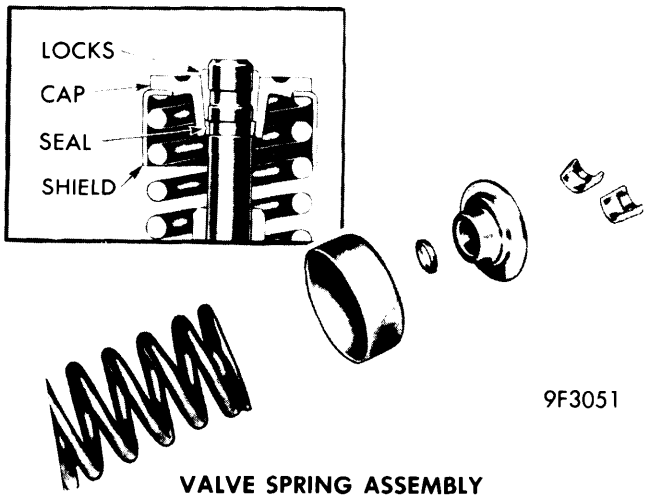
E-I-I-E-E-I-I-E-E-I-I-E (front to rear).

VALVE GUIDES

Integral with cylinder head. For oversize valve stem, ream with suitable tool (J-5830-1). Valves with .003" oversized stems are available for inlet and exhaust valves.

ROCKER ARM STUD REPLACEMENT

Replacement studs are available .001", .003" and .013" oversized. If stud becomes loose in head, ream hole to smallest oversize necessary to obtain tight driven fit. If stud threads are damaged, stud may be pulled and a new oversized stud installed. To pull old stud use sufficient flat washers and slowly tighten nut until stud is removed. Use Tool J-6880 to drive new stud. Tool should bottom on cylinder head. *NOTE – If tool is not available, measure old stud before removing.*



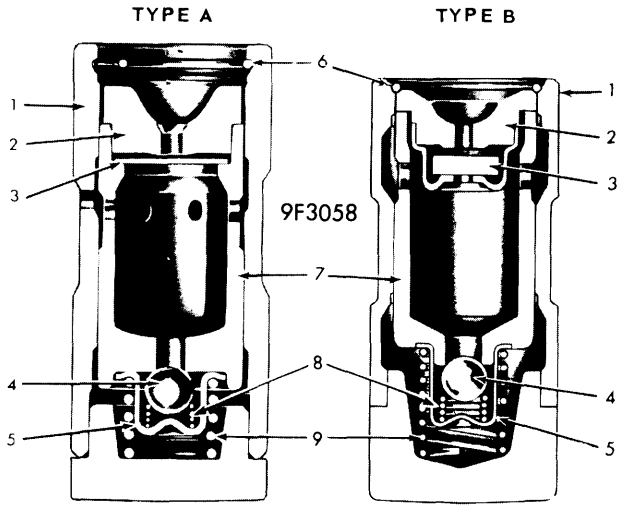
VALVE SPRING ASSEMBLY

HYDRAULIC LIFTER ADJUSTMENT

With engine idling, back off valve rocker arm nut until arm starts to clatter. Turn nut down until clatter stops, then continue ¼ turn. Wait 10 seconds, then repeat ¼ turn 3 more times until nut has turned down 1 full turn. Repeat procedure for all valves.

HYDRAULIC LIFTER SERVICE

Two types of lifters are used. They are interchangeable as complete assemblies but their parts are not interchangeable.



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

HYDRAULIC VALVE LIFTERS

1970-73 250" 6 CYL. ENGINE (Cont.)

Type "A" has a groove near its base. Type "B" uses an inertia valve and retainer which should not be removed from push rod seat. To check, shake the seat and valve assembly, valve should move. Lifters are serviced as assemblies only; if parts are faulty replace entire lifter. *CAUTION – DO NOT pump lifter assembly during leak-down test.*

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
250"	1.90"	55-64 @ 1.66"	180-192 @ 1.27"

CAMSHAFT REPLACEMENT

Remove engine front cover, valve lifters, and fuel pump. Align timing gear marks and remove camshaft thrust plate bolts by working through holes in crankshaft gear. Remove the camshaft and gear assembly by pulling out through front of block. To install, reverse removal procedure.

CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift
250"	1.8682-1.8692"	.0007-.0027"	.2217"

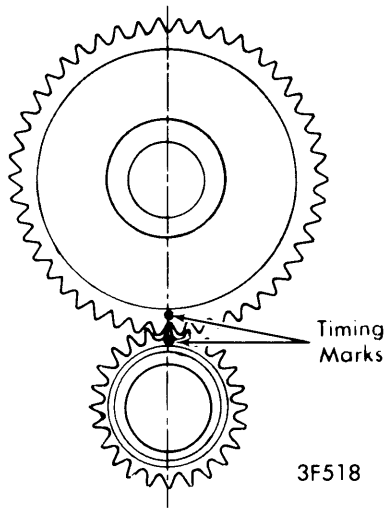
① – Journal clearance in bearing.

TIMING GEAR REPLACEMENT

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

Removal – Use support sleeve in back of gear and press shaft out of gear. *CAUTION – Thrust plate must be positioned so that Woodruff key clears plate when shaft is pressed out of gear.*

Installation – Support shaft directly in back of front bearing journal and install gear spacer ring, and thrust plate. Install Woodruff key in shaft keyway. Press camshaft gear into shaft until it bottoms against gear spacer ring. End clearance of thrust plate should be .001-.005". Install camshaft assembly in block. Line up gear teeth, then push camshaft into position. Install camshaft thrust plate-to-block screws and tighten securely. Gear runout should not exceed .004" (camshaft), .003" (crankshaft). Backlash between timing gear teeth should be .004-.006". *CAUTION– When installing gear, press on hub only.*



VALVE TIMING MARKS

ENGINE OILING

Crankcase Capacity – 4 qts.; 5 qts. with filter change.

Oil Filter Replacement – Change filter every other oil change.

Oil Pressure – All 1970-72 models 50-65 psi @ 2000 RPM. All 1973 models, normal hot pressure 40 psi @ 2000 RPM.

ENGINE OILING SYSTEM

Oil pump, mounted on right lower flange of crankcase in oil pan, draws oil from pan through a floating screen and delivers oil through passage in pump body and crankcase to full flow filter on right side of engine. Oil flows from filter to main gallery in block. Pressure regulator valve is located in oil pump and a bypass valve is located in filter base.

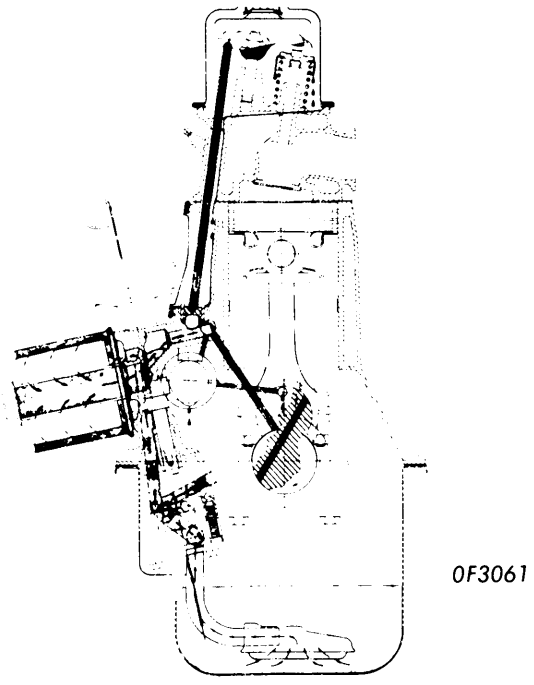
OIL PUMP

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 (with or without thrust washer at upper end) and serves as lower bearing for distributor shaft (inside diameter), and as pilot for oil pump shaft (outside diameter). Replace bushing (and thrust bearing) when distributor shaft-to-bushing clearance exceeds .0035".



ENGINE OILING SYSTEM