

# Buick 6 Engines

## 1968-71 & 1973 250" 6 CYL. ENGINE

GENERAL SPECIFICATIONS							
Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1968-70	250"	1-Bbl.	155@4200	235@1600	8.5-1	3.875"	3.530"
1971	250"	1-Bbl.	145@4200	230@1600	8.5-1	3.875"	3.530"
1973	250"	1-Bbl.	100@3600	175@1600	8.2-1	3.875"	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.

### VEHICLE IDENTIFICATION NUMBER

**1968** — Stamped on plate attached to left front door hinge pillar.

**1969-71** — Stamped in plate attached to top of instrument panel on drivers side, visible from outside vehicle.

**4569738100001**

**First Five Digits** — Model Number.

**Sixth Digit** — Model Year.

**Seventh Digit** — Assembly Plant.

**Remaining Digits** — Sequence Built.

**1973** — Stamped in plate attached to top of instrument panel on drivers side, visible from outside vehicle.

**4B69D3L100001**

**First Digit** — Make.

**Second Digit** — Model.

**Third & Fourth Digit** — Style.

**Fifth Digit** — Engine Code.

**Sixth Digit** — Model Year.

**Seventh Digit** — Assembly Plant.

**Remaining Digits** — Sequence Built.

### ENGINE IDENTIFICATION

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

Application	Man. Trans.	Auto. Trans.
<b>250" 1-Bbl.</b>		
1968.....	SA.....	SE, SD
1969.....	LA, LE.....	ME, MA
1970.....	SA.....	SB
1971.....	DF.....	EA
1973.....	CCC, CCD.....	CCA, CCB

### ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

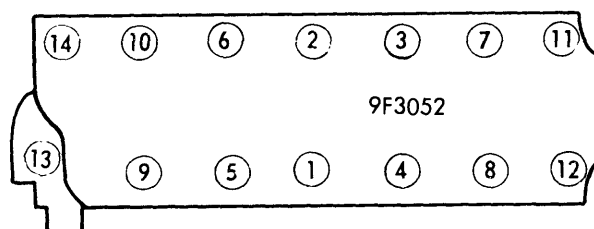
### OIL PAN REMOVAL

See Oil Pan Removal at end of ENGINE Section.

### CYLINDER HEAD INSTALLATION

Clean surfaces of cylinder head and block. Tap out head bolt holes. Clean and lubricate threads of head bolts. Tighten three times around in sequence shown in diagram, finally reaching torque shown in specification table.

**NOTE** — Do not use gasket sealer on composition steel asbestos gasket.



**CYLINDER HEAD BOLT TIGHTENING SEQUENCE**

PISTONS, PINS, RINGS						
Engine	PISTONS ① Clearance	PINS		RINGS		
		② Piston Fit	③ Rod Fit	Rings	End Gap	④ Side Clearance
250" 1968	.0005-.0011"	.00015-.00025"	.0008-.0016"	1 & 2	.010-.020"	.0012-.0032"
				3	.015-.025"	.000-.005"
1969-71	.0005-.0015"	.00015-.00025"	.0008-.0016"	1 & 2	.010-.020"	.0012-.0032"
				3	.015-.025"	.000-.005"
1973	.0005-.0015"	.00015-.00025"	.0008-.0016"	1	.010-.020"	.0012-.0027"
				2	.010-.020"	.0012-.0032"
				3	.015-.055"	.005" Max.

① — Wear Limit — .0025".

② — Wear Limit — .001".

③ — Interference fit.

④ — Wear Limit — .001".

# Buick 6 Engines

## 1968-71 & 1973 250" 6 CYL. ENGINE (Cont.)

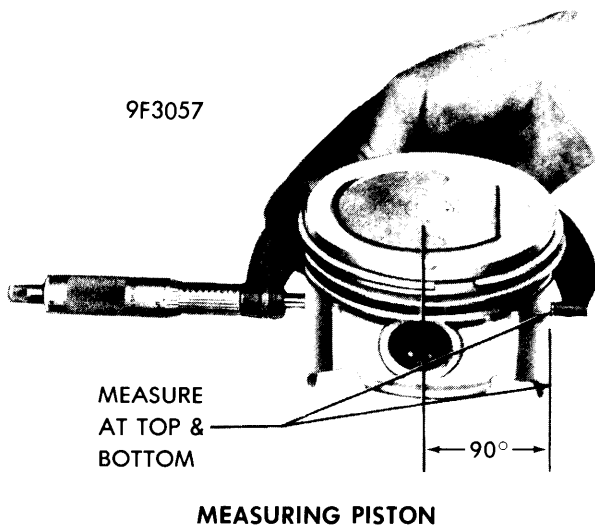
### FITTING PISTONS

To check for correct piston fit in cylinder bore measure bore approximately 2½" from top. Measure piston diameter 2½" from top and at right angles to piston pin. See table for correct piston clearance.

**NOTE** — Both block and piston must be within 10°F of each other when measurements are made, or expansion errors will cause inaccuracy.

### PISTON & ROD INSTALLATION

Install connecting rod guides on rod to retain upper bearing in place and protect crankshaft from scoring. Install assembly with notch on piston forward and oil spurt hole in rod up.

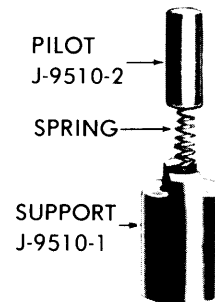
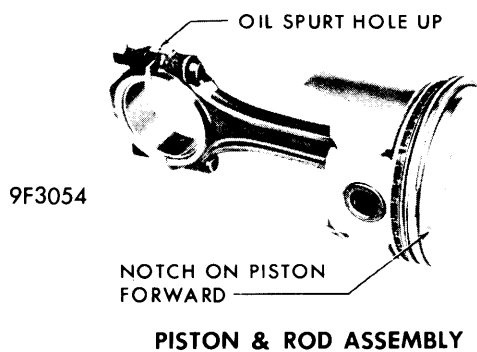
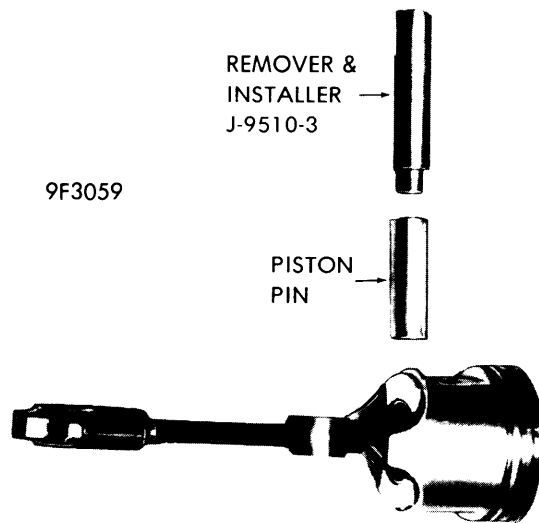


### PISTON PIN REPLACEMENT

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 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 piston head notch 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 in support. Check for free movement of piston on pin.



CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.	① Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	Sideplay
1968-69	2.300"	.0003-.0029"	No. 7	.002-.006"	1.999-2.000"	.0007-.0027"	.009-.013"
1970-71	2.2983-2.2993"	.0003-.0029"	Rear	.002-.006"	1.9928-2.000"	.0007-.0027"	.009-.014"
1973	2.2983-2.2993"	.0003-.0029"	Rear	.002-.006"	1.9928-2.000"	.0007-.0027"	.009-.014"

① — 1973 No. 1 bearing .002".

## 1968-71 & 1973 250" 6 CYL. ENGINE (Cont.)

### REAR MAIN BEARING OIL SEAL

**NOTE** - Upper and lower seals may be removed and replaced without removing crankshaft. Replace seal halves as a unit.

**Removal** - Remove rear main bearing cap and pry lower seal from groove. Use a suitable tool to tap upper seal around groove until seal can be pulled out with pliers.

**Installation** - Seal must be installed with lip towards engine front. Oil neoprene seal and roll into groove. Install lower seal in cap and be sure seal cross tabs are properly seated. Torque bearing cap bolts to specification.

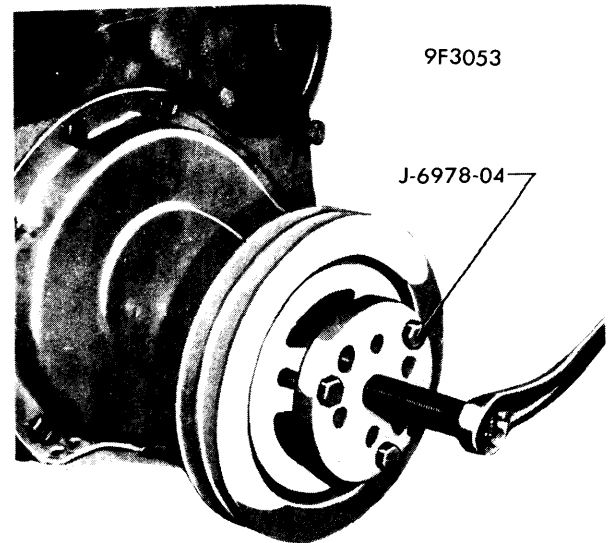
### ENGINE FRONT COVER & OIL SEAL

Remove oil pan and torsional damper. Remove front cover bolts, remove cover. Pry old seal from cover and install new seal in cover with open end of seal toward inside of cover. When driving seal into position, support cover around seal area with suitable tool. Install suitable centering tool in seal and install cover to block. **NOTE** - Centering tool is necessary to prevent damage to seal and to position seal evenly around the balancer or hub surface. Install torsional damper and oil pan.

### TORSIONAL DAMPER REPLACEMENT

**Removal** - Remove radiator and belt. Install Tool J-6978 on damper and turn puller screw.

**Installation** - Coat damper hub seal contact area with oil. Attach Tool J-22197, tighten; install damper, drive on with Tool J-22549-2 until damper bottoms on gear.



TORSIONAL DAMPER REMOVAL

### ROCKER ARM STUD REPLACEMENT

Replacement studs are available .001", .003" and .013". 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 new .001" oversized stud installed. To pull old stud re-thread damaged 3/8"-24 threads to 3/8"-16 thread. Using sufficient flat washers and 3/8"-16 nut slowly tighten nut until stud is removed. Use Tool J-6880 to drive new stud. Tool should bottom on cylinder head.

VALVES							
Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
250"	Int.	1.715-1.725"	45°	46°	1/32-1/16"	.3410-.3417"	.001-.0027"
	Exh.	1.495-1.505"	45°	46°	1/16-5/64"	.3410-.3417"	.0015-.0032"

### VALVE ARRANGEMENT

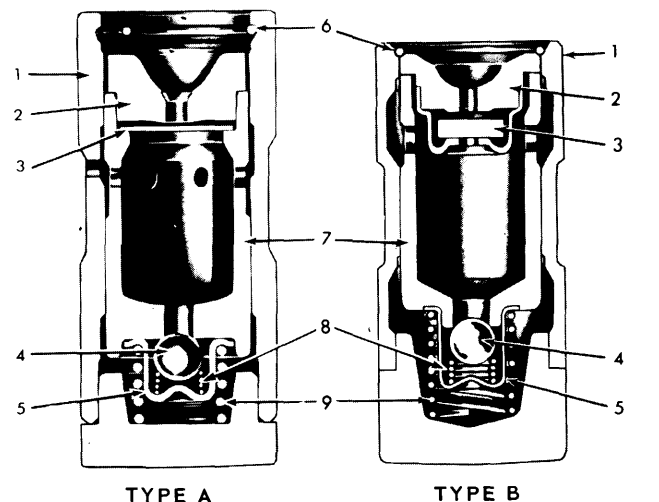
E-I-I-E-E-I-I-E-E-I-I-E

### VALVE GUIDES

Integral with cylinder head. Oversize valve stems come in .003, .015 & .030" sizes.

### 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, 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 leakdown test.



- |  |        |                           |
|--|--------|---------------------------|
| 1. Lifter Body   | 9F3058 | 5. Check Ball Retainer    |
| 2. Push Rod Seat   |        | 6. Push Rod Seat Retainer |
| 3. Metering Valve (Lifter A)<br>Inertia Valve (Lifter B) |        | 7. Plunger                |
| 4. Check Ball  |        | 8. Check Ball Spring      |
|  |        | 9. Plunger Spring         |

HYDRAULIC VALVE LIFTERS

## 1968-71 & 1973 250" 6 CYL. ENGINE (Cont.)

### HYDRAULIC LIFTER ADJUSTMENT

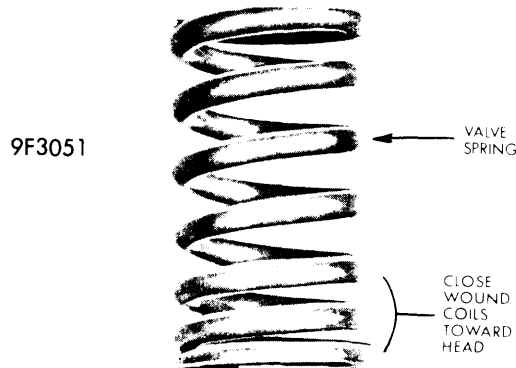
**NOTE** — On 1968-71 Models, manufacturer recommends performing lifter adjustment with engine idling. On 1973 Models, the manufacturer recommends lifter adjustment with engine off.

**Engine Idling Method** — Back off valve rocker arm nut until arm starts to clatter. Turn nut down until clatter stops, then continue 1/4 turn. Wait 10 seconds, then continue in 1/4 turn steps until nut has been turned down one full turn. Repeat procedure for all valves.

**Engine Off Method** — Adjust valves when lifters are on base circle of camshaft lobe as follows:

- 1) Mark distributor housing with chalk at each cylinder position (plug wire). Crank engine until distributor rotor is in line with the number one cylinder mark, piston should be on compression stroke, TDC. Both valves on number one cylinder may now be adjusted.
- 2) Back out rocker arm adjusting nut until lash is felt on pushrod. Turn nut in until lash is removed, then turn in one additional revolution to center lifter plunger.
- 3) Adjust remaining valves following the firing order and positioning each piston at end of compression stroke on TDC.

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
250"	1.90"	56-64 @ 1.66"	180-192 @ 1.27"



### VALVE SPRING INSTALLATION

CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift
250"	1.8682-1.8692"	.0015-.0035"	.2217"

① — Journal clearance in bearing.

### CAMSHAFT

**Removal** — Remove valve lifters, front cover, grille, radiator, fuel pump and condenser if equipped with A/C. Align timing gear marks and remove camshaft thrust plate bolts. Remove camshaft by pulling out through front of block.

**Installation** — Install camshaft and gear assembly being careful not to damage bearings or camshaft. Line up timing marks on camshaft and crankshaft gears and push camshaft into position. Install bolts and torque to specifications.

### CAMSHAFT ENDPLAY

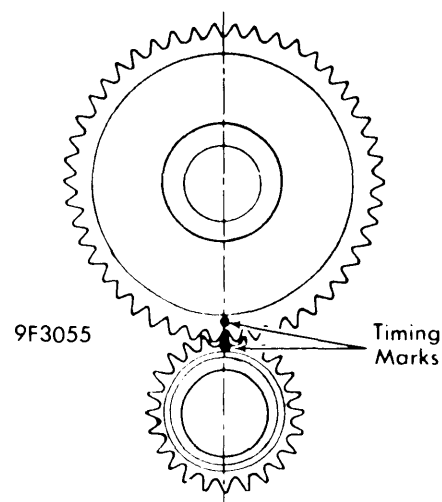
Taken by thrust plate between camshaft sprocket and front bearing journal.

### TIMING GEAR SERVICE

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 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. 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.



### TIMING GEAR MARKS

## 1968-71 & 1973 250" 6 CYL. ENGINE (Cont.)

### ENGINE OILING

**Crankcase Capacity** – 4 qts., 5 qts. with filter change.

**Oil Filter Replacement** – Change filter every other oil change.

**Oil Pressure** – (1968-69) 30-45 psi @ 1500 RPM.  
(1970-71) 50-65 psi @ 2000 RPM.  
(1973) 40 psi @ 2000 RPM.

**Pressure Regulator Valve** – Located in oil pump body. Not adjustable.

### 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 oil gallery in block and is distributed as detailed below. Pressure regulator valve is located in oil pump and a bypass valve is located in filter base.

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

**Connecting Rods & Pistons** – Oil 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 towards 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 pushrod, to a hole in upper end of pushrod, that matches hole in rocker arm. Oil sprayed from this hole and across rocker arm lubricates valve stem tip. Oil from 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 from 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).

### DISTRIBUTOR DRIVE SHAFT LOWER BEARING

Bushing pressed onto 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".

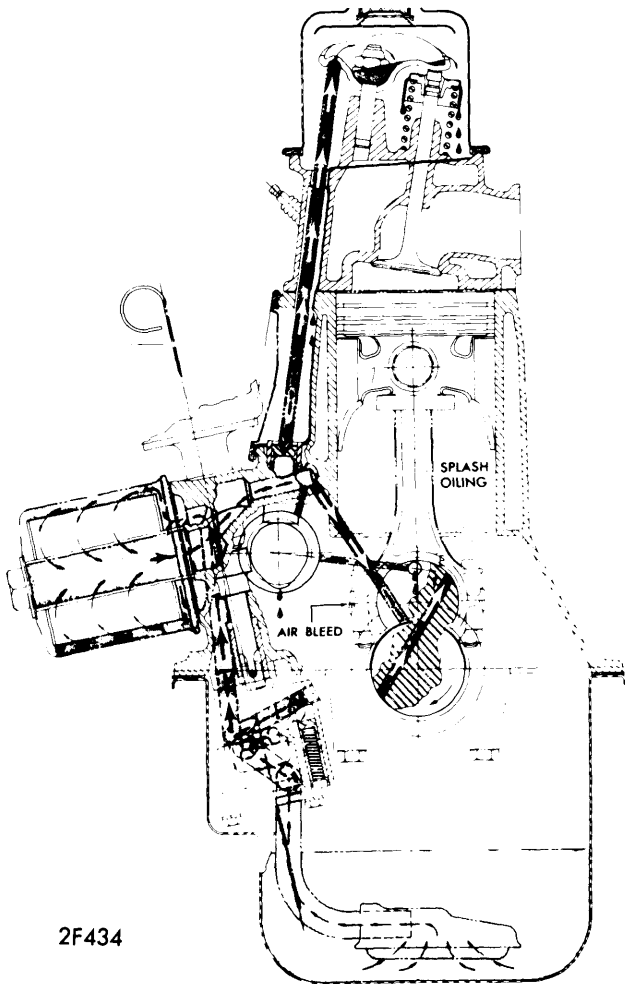
**Removal** – Use suitable tool (J-9534-01) to remove bearing. Drive out thrust washer with drift punch.

**Installation** – Drive new thrust washer on with suitable tool. Drive bushing into position. Proper depth of bushing is determined when tool bottoms against cylinder block.

### 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.

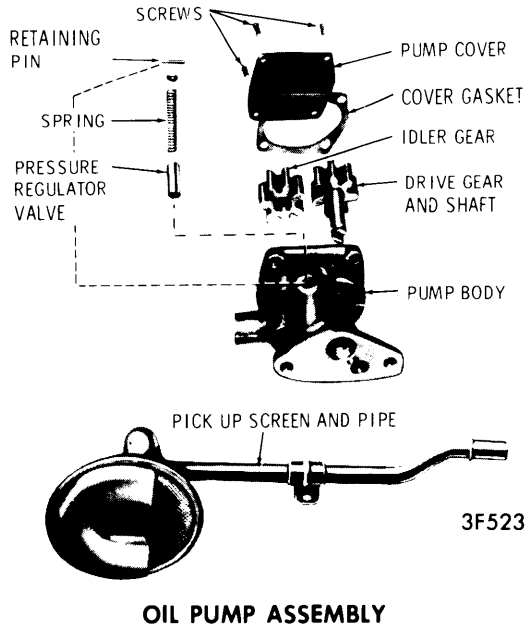


ENGINE OILING SYSTEM

# Buick 6 Engines

## 1968-71 & 1973 250" 6 CYL. ENGINE (Cont.)

### ENGINE OILING (Cont.)



### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Cylinder Head .....	95
Main Bearings.....	65
Connecting Rods.....	35
Oil Pan to Cylinder Block (1/4-20).....	7
(5/16-18).....	10
Oil Pan to Front Cover .....	5
Engine Front Cover.....	7
Camshaft Thrust Plate .....	7
Oil Pump Mounting .....	9
Oil Pump Cover.....	6
Water Pump .....	15
Thermostat Housing .....	30
Exhaust to Intake Manifold.....	25
Intake Manifold to Head .....	35
Flywheel .....	60
Clutch Pressure Plate .....	35
Torsional Damper .....	60

### ENGINE NOTES

- ▶ **1969 250" ENGINE OPERATION IN AREAS OF LOW OCTANE RATED GASOLINE NOTE:** Engine damage can be caused by detonation as a result of the use of low octane fuels. If satisfactory fuels (82-90 octane) cannot be obtained, install special export pistons (#3886055) available from dealer.
- ▶ **1969 ENGINE OIL LEAK DIAGNOSIS NOTE:** Some oil companies are now marketing engine oils that are dyed red. The use of this red dyed oil can lead to difficulty in diagnosing and locating oil leaks between the engine and the transmission. Before any work is performed to correct an oil leak, be certain that this area is the origin of the leak.
- ▶ **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.