

Ford Motor Co. V8 Engines

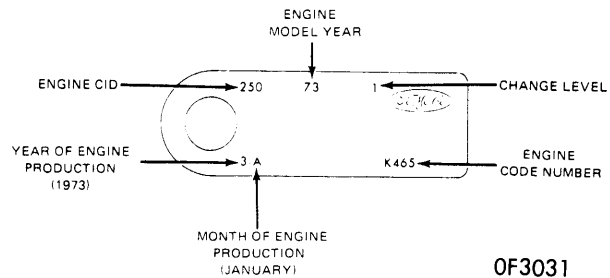
1970-73 351"C, 400" V8 ENGINES

GENERAL SPECIFICATIONS							
Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1970	351"C	2-Bbl.	250@4600	355@2600	9.5-1	4.00"	3.50"
		4-Bbl.	300@5400	380@4300	11.0-1	4.00"	3.50"
1971	351"C	2-Bbl.	240@4600	350@2600	9.0-1	4.00"	3.50"
		4-Bbl.	285@5400	370@3400	10.7-1	4.00"	3.50"
	400"	4-Bbl. HO	330@5400	370@4000	11.0-1	4.00"	3.50"
		2-Bbl.	260@4400	400@2200	9.0-1	4.00"	4.00"
1972	351"C	2-Bbl.	163@3800	277@2000	8.6-1	4.00"	3.50"
		4-Bbl.	248@5400	299@3800	8.6-1	4.00"	3.50"
	400"	4-Bbl. HO	266@5400	301@3600	8.8-1	4.00"	3.50"
		2-Bbl.	168@4200	297@2200	8.4-1	4.00"	4.00"
1973	351"C	2-Bbl.	.....	.....	....	4.00"	3.50"
	400"	4-Bbl.	.....	.....	....	4.00"	3.50"
		2-Bbl.	.....	.....	....	4.00"	4.00"

► **NET HORSEPOWER & TORQUE NOTE:** Horsepower and Torque figures given for 1972 are NET. NET Horsepower and Torque represent power at the flywheel when the engine is installed in 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

Engine may be identified by the fifth digit of the Vehicle Warranty Plate identification number, attached to rear face of left front door. On 1970 and later models, engine may be identified by the Vehicle Identification Number stamped on a metal tab fastened to instrument panel close to windshield on drivers side of car and visible from outside. The fifth digit establishes engine identification.



ENGINE IDENTIFICATION TAG

Engine & Year	Code Letter
1970	
351" 2-Bbl.	H
4-Bbl.	M
1971	
351" 2-Bbl.	H
4-Bbl.	M
4-Bbl. GT	Q
4-Bbl. BOSS	R
400" 2-Bbl.	S
1972	
351" 2-Bbl.	H
4-Bbl. CJ	Q
4-Bbl. BOSS	R
400" 2-Bbl.	S
1973	
351" 2-Bbl.	H
4-Bbl.	Q
400" 2-Bbl.	S

NOTE — On the 351"W"2-Bbl. engine further identification must be made to determine if engine is a "C" (Cleveland) or "W" (Windsor) built engine. The identification can be made at the fuel pump. The "C" engine has top and bottom (vertical) fuel pump mounting bolts. The "W" engine has front and rear (horizontal) fuel pump mounting bolts.

Engine Identification Tag — Attached to engine, identifies engine for parts replacement, year model, and cubic inch displacement (see illustration).

TIGHTENING SPECIFICATIONS (FT. LBS.)		
Application	1970	1971-73
Cylinder Head..... ①		①
Intake Manifold		
5/16"	23-25	21-25
3/8"	28-32	27-33
Exhaust Manifold	18-24	②12-16
Oil Pan		
5/16"	9-11	11-13
1/4"	7-9	7-9
Main Bearing Caps		
1/2"	95-105	95-105
3/8"		③35-45
Connecting Rod Caps.....	40-45	40-45
Vibration Damper.....	70-90	70-90
Camshaft Sprocket	40-45	40-45
Camshaft Thrust Plate	9-12	9-12
Flywheel-to-Crankshaft	75-85	75-85
Rocker Arm Cover	3-5	3-5
Rocker Arm Bolt	17-23	18-25
Engine Front Cover.....	12-15	14-20

① — See Cylinder Head Installation.
 ② — 351"C 12-22.
 ③ — 3/8" Bolts.

1970-73 351" C, 400" V8 ENGINES (Cont.)

ENGINE NOTES

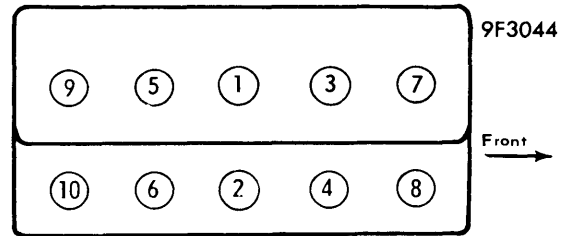
- ▶ **351" C ENGINE:** If an engine has one or more broken fulcrum bolts, check breakaway torque in tightening direction on remaining bolts. Discard any bolt that requires less than 20 ft. lbs. Remove all 16 fulcrums from head and file or grind chamfer piloting edges so that fulcrum fits freely in head. Installation of new bolts is recommended. Install bolts and torque to 20-25 ft. lbs. Back off 4 full turns, then retorque to 20-25 ft. lbs.
- ▶ **1970-71 ENGINE OVERHEATING 351" C, 400" ENGINES:** When diagnosing engine overheating problems, remove thermostat and inspect cylinder block coolant crossover passage between thermostat opening. Each cylinder bank should be probed to be sure that no obstruction exists. In addition, cylinder head gaskets should be checked to verify correct installation. Lower front end of gasket should have a tab that extends 1/8-1/4". The bottom rear corner of gasket is rounded. **CAUTION - Do not operate engine without thermostat. Localized overheating and premature valve failure will result.**
- ▶ **1970-72 NEW VALVE GUIDE REPAIR BUSHINGS:** New cylinder head valve guide repair bushings are available for vehicles exhibiting excessive valve guide wear to the extent that oversize valves cannot be used.

CYLINDER HEAD INSTALLATION

Tighten cylinder head bolts progressively in sequence shown in diagram. Torque bolts 3 times around as follows:

Cylinder Head Tightening Specifications (Ft. Lbs.)

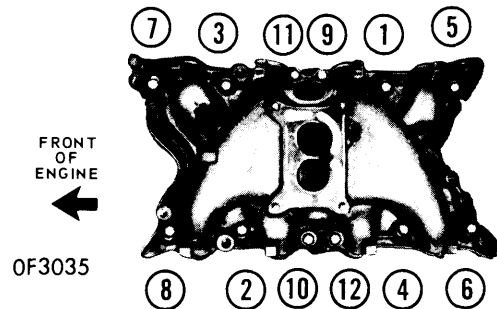
Engine	Step 1	Step 2	Step 3
351" 1970	55	65	95-100
351" & 400" 1971-73	55	75	95-105



CYLINDER HEAD TIGHTENING SEQUENCE

INTAKE MANIFOLD INSTALLATION

Coat intake manifold and seal surfaces with oil resistant sealer. Position front and rear seals on cylinder block and new gaskets on heads. Make sure that holes in gaskets are aligned with holes in cylinder heads. Position gasket slots in end tabs over ribs on seals. Lower manifold on engine. Check for correct position of gaskets and seals before installing attaching bolts. Install bolts and tighten in two steps, then to specification in sequence shown in diagram.



INTAKE MANIFOLD TIGHTENING SEQUENCE

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	① Clearance	Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
1970-72 351" C	.0014-.002"	.0003-.0005"	Press Fit	1 & 2 3	.010-.020" .015-.069"	.002-.004" Snug
1971-72 351" C HO	.0034-.0042"	.0006-.0008"	Press Fit	1 & 2 3	.010-.020" .015-.069"	.002-.004" Snug
1971-72 400"	.0014-.0022"	.0003-.0005"	Press Fit	1 & 2 3	.010-.020" .015-.069"	.002-.004" Snug
1973 351" C, 400"	.0014-.0022"	.0002-.0004"	Press Fit	1 & 2 3	.010-.020" .015-.055"	.002-.004" Snug

① - Measured at piston bore centerline, 90° to pin bore.

FITTING PISTONS

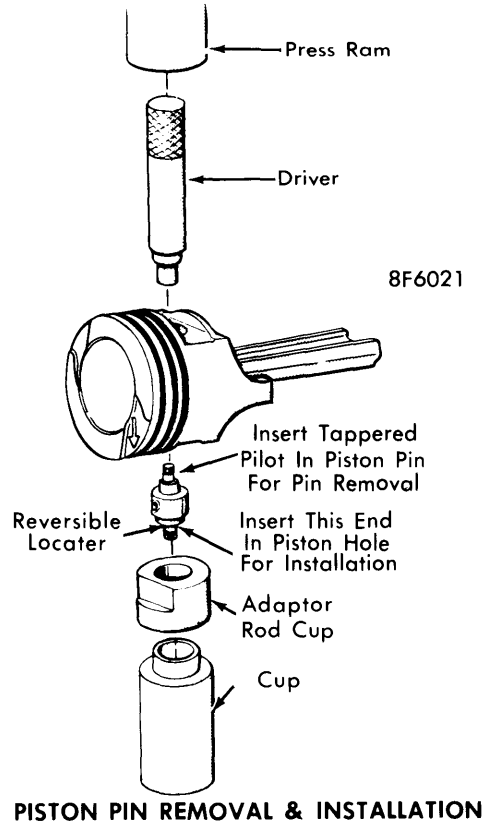
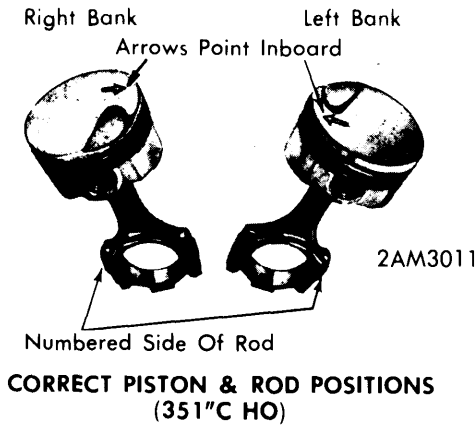
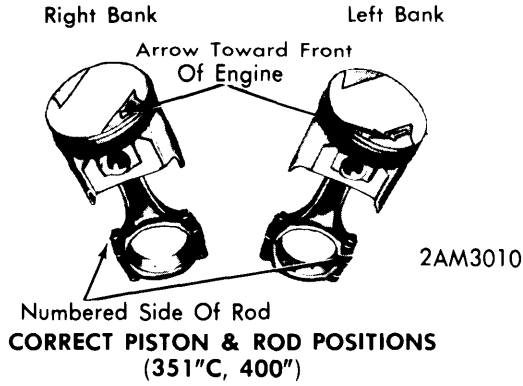
Measure piston at centerline of piston pin bore 90° to pin bore axis. Measure cylinder bore at right angles to center line of crankshaft, below ring travel. Piston clearance should be as shown in table.

PISTON PIN REPLACEMENT

Piston pins are replaced using arbor press and suitable pilots and drivers, (see illustration).

Ford Motor Co. V8 Engines

1970-73 351"C, 400" V8 ENGINES (Cont.)



CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	Sideplay
351\"/> 							
1970-71	2.7484-2.7492"	.0005-.0015"	No.3	.004-.010"	2.3103-2.3111"	.001-.0015"	.010-.020"
1972	2.7484-2.7492"	.0001-.0015"	No.3	.004-.010"	2.3103-2.3111"	.001-.0015"	.010-.020"
1973	2.7484-2.7492"	.0009-.0015"	No.3	.004-.010"	2.3103-2.3111"	.0008-.0015"	.010-.020"
351\"/> 							
1971-72	2.7484-2.7492"	.0011-.0015"	No.3	.004-.010"	2.3103-2.3111"	.0011-.0015"	.010-.020"
400\"/> 							
1971	2.9994-3.0002"	.0005-.0015"	No.3	.004-.010"	2.3103-2.3111"	.001-.0015"	.010-.020"
1972	2.9994-3.0002"	.0011-.0015"	No.3	.004-.010"	2.3103-2.3111"	.0011-.0015"	.010-.020"
1973	2.9994-2.3002"	.0010-.0015"	No.3	.004-.008"	2.3103-2.3111"	.0011-.0015"	.010-.020"

MAIN BEARING INSTALLATION

1) **All Caps** – Number caps if necessary to insure installation in correct order. Arrow on cap points to front of engine.

2) **Rear Caps** – Coat only rear mating surface of cap with sealer. Do not use sealer forward of oil slinger grooves. Do not use sealer forward of side seal grooves. Install cap immediately after sealer is applied so sealer will not set.

THRUST BEARING ALIGNMENT

Install all bearing caps except thrust bearing cap and torque to specifications. Install thrust bearing cap with bolts finger tight. Pry crankshaft to front of engine, then pry thrust cap to rear of engine. While holding crankshaft forward, tighten thrust bearing cap bolts to specification. Check endplay of crankshaft.

REAR MAIN BEARING OIL SEAL

Complete seal is replaced without removing crankshaft as follows:

1) Loosen all main bearing bolts, lowering crankshaft not to exceed 1/32". Remove rear main bearing cap, remove seal half. Remove upper seal half with special tool, being careful not to scratch or damage crankshaft journal or seal surfaces.

2) Remove oil seal retaining pin from bearing cap (if equipped). Pin is not used with new type seal.

3) Dip seal halves in engine oil. Install upper seal in groove with undercut side of seal toward the front of engine, by rotating it on seal journal until 3/8" protrudes below the parting surface. Tighten remaining bearing cap bolts to specifications.

1970-73 351" C, 400" V8 ENGINES (Cont.)

4) Install lower seal in rear bearing cap with undercut side towards front of engine, allowing seal to protrude 3/8" above the parting surface.

5) Apply thin coating of oil-resistant sealer to cap at rear of tap mating surface. *Do not apply sealer to area forward of side seal groove.* Install bearing cap and torque bolts to specification.

ENGINE FRONT COVER

Removal – Drain cooling system and crankcase. Remove fan and shroud, power steering pump, water pump pulley and drive belts. Remove crankshaft pulley and vibration damper. Remove engine front cover and water pump as an assembly.

Installation – Use suitable tool to center front cover on crankshaft. Push in on tool and tighten bolts to specification. Reverse removal procedure to complete installation.

FRONT COVER OIL SEAL

Removal – Install suitable seal puller tool (No. T70P-6B070-B), and tighten through bolts to position seal puller under seal flange. Alternately tighten four puller bolts to remove oil seal.

Installation – Coat seal with grease and press into front cover using suitable tool (No. T70P-6B070-A). Check seal to make sure that seal has fully seated.

VALVES								
Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift	
351" C 1970 2-Bbl.	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.407"
	Exh.	1.655"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.407"
4-Bbl.	Int.	2.191"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.427"
	Exh.	1.710"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.427"
1971 2-Bbl.	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.407"
	Exh.	1.655"	44°	45°	.090-.110"	.3411-.3418"	.0015-.0032"	.407"
4-Bbl.	Int.	2.191"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.427"
	Exh.	1.710"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.453"
1972 2-Bbl.	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.407"
	Exh.	1.655"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.407"
4-Bbl.	Int.	2.191"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.427"
	Exh.	1.710"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.453"
1973 All	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.001-.0027"	.407"①
	Exh.	1.655"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.407"①
351" C HO 1971 4-Bbl.	Int.	2.190"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.477"
	Exh.	1.7095"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.477"
1972 4-Bbl.	Int.	2.191"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.490"
	Exh.	1.710"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.490"
400" 1971 2-Bbl.	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.427"
	Exh.	1.655"	44°	45°	.090-.110"	.3411-.3418"	.0015-.0032"	.433"
1972 2-Bbl.	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.0010-.0027"	.427"
	Exh.	1.655"	44°	45°	.070-.090"	.3411-.3418"	.0015-.0032"	.433"
1973 All	Int.	2.041"	44°	45°	.060-.080"	.3416-.3423"	.001-.0027"	.407"②
	Exh.	1.655"	44°	45°	.060-.080"	.3411-.3418"	.0015-.0032"	.407"②

① – 351" C 4-Bbl. engine Int. .481" & Exh. .490".

② – 400" 4-Bbl. engine Int. .427" & Exh. .433".

VALVE ARRANGEMENT

E-I-E-I-E-I-E-I (Left bank, front to rear), I-E-I-E-I-E-I-E (Right bank, front to rear).

VALVE STEM SEALS

Cup or umbrella type seals used on all valves. Install seals with cup side down over valve guide.

VALVE GUIDE SERVICING

To ream guides for installation of valves with oversize stems, always use reamers in sequence and reface valve seat after valve guide is reamed. Reamers are available in .003" oversize with standard pilot; .015" oversize reamer with .003" oversize pilot; and oversize reamer with .015" oversize pilot.

ROCKER ARM ASSEMBLY

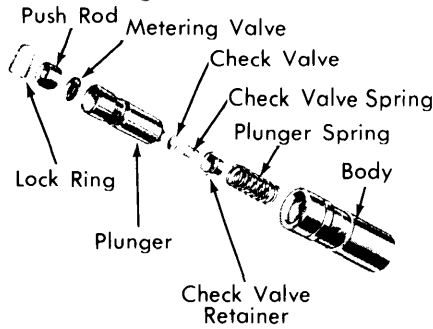
Rocker arms mounted on individual studs threaded into cylinder head. To install, stud threads should be lightly oiled. Thread to stop and torque to specifications. Follow same procedure and sequence used in adjusting valve clearance.

1970-73 351"C, 400" V8 ENGINES (Cont.)

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
351"C 1971-73	2-Bbl. 2.07"	76-84 <i>a</i> 1.82"	199-221 <i>a</i> 1.42"
	4-Bbl. 2.05"	85-95 <i>a</i> 1.82"	271-299 <i>a</i> 1.32"
351"C HO 1971-72	4-Bbl. 2.03"	88-96 <i>a</i> 1.82"	229-331 <i>a</i> 1.32"
400" 1971-73	2-Bbl. 2.06"	76-84 <i>a</i> 1.82"	251-237 <i>a</i> 1.39"

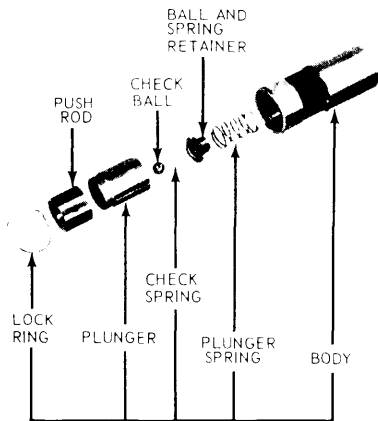
VALVE SPRING INSTALLATION

Spring ends must be square within 1/16". Install springs with end of damper spring coil 135° counterclockwise from coil end of valve spring.



TYPE I LIFTER ASSEMBLY

OF3042



TYPE II LIFTER ASSEMBLY

VALVE SPRING INSTALLED HEIGHT

Installed height must not exceed specification listed in table below. Measure height from surface of cylinder head spring pad to underside of spring retainer. If height is greater than specified, install spacer on head under spring to bring height within limits. **CAUTION** - If more than two spacers are used, an overload on springs and camshaft will result.

Valve Spring Installed Height

Engine	Height
351" C & 400"	1.13-1.16-1.27-1.32"

HYDRAULIC VALVE LIFTER ASSEMBLY

All Engines - Two different types of lifters used, (Type I & Type II). Lifters are serviced as assemblies only. Parts are not interchangeable.

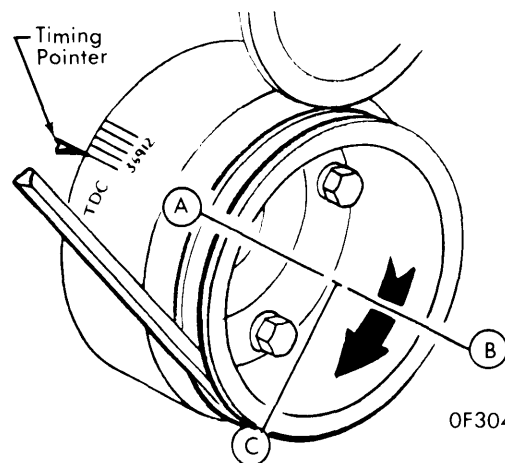
Servicing (All) - Always check rocker arm to valve stem clearance before concluding a noisy lifter is defective. After cleaning and reassembling lifters, they should be tested for lead down rate. Use lifter tester according to directions of manufacturer. Leak down rate is 5-50 seconds measured at 1/16" plunger travel.

HYDRAULIC VALVE LIFTER ADJUSTMENT

Repeated valve (seat and face) reconditioning operations will decrease valve stem to rocker arm clearance to the point that if compensation is not made, the valve lifters will cease to function. To compensate for any dimensional changes in valve mechanism, a .060" shorter or a .060" longer replacement push rod is available. To determine whether or not a longer or shorter push rod is necessary, the clearance between rocker arm and valve stem must be checked.

NOTE - Valve lifter must be completely collapsed when checking valve clearance. Use suitable tool and slowly collapse valve lifter until plunger is bottomed. Hold lifter down while checking clearance. Procedure for checking clearance is as follows:

- 1) Rotate crankshaft until No. 1 piston is at TDC (Point "A") after compression stroke as indicated by timing mark on crankshaft damper and pointer, (see illustration). Make chalk mark on damper 180° (Point "B") from TDC mark. Make chalk mark on damper 90° (Point "C") counterclockwise from TDC mark.
- 2) With damper at position "A", check the following valves: Intake No. 1-4-8. Exhaust No. 1-3-7.
- 3) Rotate crankshaft 180° (1/2 turn) clockwise from position "A" to position "B" and check the following valves: Intake No. 3-7. Exhaust No. 2-6.
- 4) Rotate crankshaft 270° (3/4 turn) clockwise from position "B" to position "C" and check the following valves: Intake No. 2-5-6. Exhaust No. 4-5-8.



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POSITIONS FOR CHECKING VALVE CLEARANCE

1970-73 351"C, 400" V8 ENGINES (Cont.)

CAMSHAFT REMOVAL

Remove radiator, engine front cover, sprockets and timing chain, distributor, fuel pump, valve lifters and cams, and thrust plate. Carefully remove camshaft so as not to damage bearings.

CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift
1970-73			
No.1	2.1238-2.1248"	.001-.003"	.....
No.2	2.0655-2.0665"	.001-.003"	.....
No.3	2.0505-2.0515"	.001-.003"	.....
No.4	2.0355-2.0365"	.001-.003"	.....
No.5	2.0205-2.0215"	.001-.003"	.....

① — See Cam Lobe Lift Table.

CAMSHAFT END THRUST

Taken by thrust plate (and spacer on some engines) behind camshaft sprocket. Side of spacer with chamfer on inside diameter must be against camshaft front journal. Install thrust plate with oil groove up and facing front. If camshaft end thrust excessive, replace thrust plate. Use oversize thrust plate if necessary. **CAUTION** — Do not check end thrust by prying camshaft back and forth; sprocket may be damaged or broken. Loosen rocker arms to take load off cams so camshaft may be moved back and forth by hand.

CAMSHAFT BEARING REPLACEMENT

With camshaft removed, remove oil pan and oil pump. If installed, remove oil pan baffle plate. With suitable driver/puller

tool, remove bearings. No. 1 (front) bearing must be inset from front face of cylinder block.

No. 1 Camshaft Bearing Inset

Application

All Models..... .040-.060"

① Measurement

① — Distance that front edge of bearing is installed toward the rear from the front face of cylinder block.

CAM LOBE LIFT

Check with dial indicator to specifications listed in table.

Engine & Year	Intake	Exhaust
351"C		
1970 2-Bbl. ....	.235"	.235"
4-Bbl. ....	.247"	.247"
1971 2-Bbl. ....	.235"	.235"
4-Bbl. ....	.247"	.262"
1972 2-Bbl. ....	.235"	.235"
4-Bbl. ....	.247"	.262"
1973 2-Bbl. ....	.235"	.235"
4-Bbl. ....	.278"	.283"
351"C HO		
1971 4-Bbl. ....	.290"	.290"
1972 4-Bbl. ....	.298"	.298"
400"		
1970-73 .....	.247"	.250"

ENGINE OILING

Crankcase Capacity — 4 qts. Add 1 qt. with filter change.

Oil Pressure — (Hot @ 2000 RPM) 50-70 Lbs.

Pressure Regulator Valve — In pump body, not adjustable.

Oil Filter Replacement — Replace every 6000 miles.

OIL PUMP

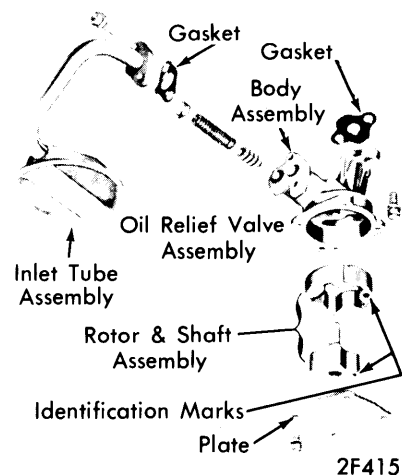
Rotor type used on all engines. See illustration for typical arrangement of parts. Pump cover plate screw torque is 9-12 ft. lbs. Specifications are as follows:

Oil Pump Specifications

Application	Specification
Outer Race to Housing .....	.006-.013"
Rotor Endplay .....	.0011-.0041"
Shaft to Housing .....	.0015-.0029"
Relief Valve to Bore .....	.0015-.0029"

Relief Valve Spring Specification

Engine	Lbs. Pressure	Length
351"C & 400".....	23.6-24.6	1.370"



OIL PUMP TYPICAL