

Ford V8 Engines

4.2, 5.0 & 5.8 LITER V8

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engine is identified by a letter code in the eighth position of Vehicle Identification Number (VIN). The VIN is stamped on a metal tab, attached to left upper side of instrument panel, near windshield. The VIN is also located on the Safety Compliance Certification Label, located on left door lock pillar.

ENGINE IDENTIFICATION CODES

| Engine | Code |
|-------------------------|------|
| 4.2L (255") 2-Bbl. | D |
| 5.0L (302") 2-Bbl. | F |
| 5.8L (351") 2-Bbl. | W |

ENGINE REMOVAL

See *Engine Removal* at end of *ENGINE* Section.

CYLINDER HEAD & MANIFOLD

INTAKE MANIFOLD

Removal

1) Drain cooling system. Remove air cleaner, intake duct assembly, and crankcase ventilation hose. Disconnect accelerator cable, speed control linkage, and transmission kickdown rod from carburetor. Remove accelerator cable bracket.

2) Disconnect electric choke and carburetor solenoid wires. Disconnect primary and secondary wires from coil. Disconnect spark plug wires from plugs. Remove distributor cap and wires as an assembly.

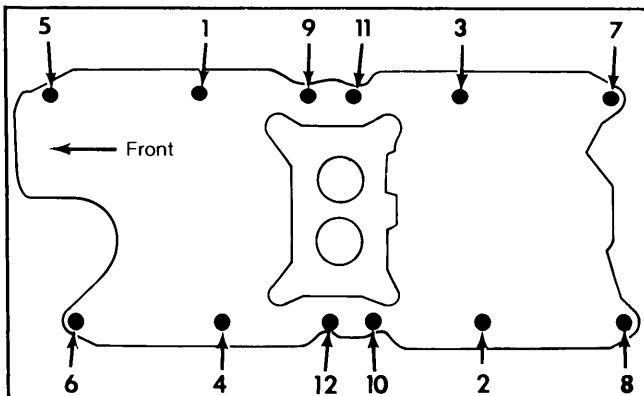
3) Remove fuel line at carburetor. Disconnect fuel evaporation hoses. Disconnect vacuum hoses at distributor and remove distributor. Disconnect upper radiator hose, by-pass hose and heater hose from intake manifold. Disconnect temperature sending unit wire.

4) Remove intake manifold and carburetor as an assembly. Remove and discard gaskets and seals. Discard attaching bolt sealing washers.

Installation

1) Clean all gasket mating surfaces. Apply $\frac{1}{8}$ " (3 mm) bead of RTV sealer at 4 corners of cylinder block seal mounting surface-to-cylinder head junction. Apply $\frac{1}{16}$ "

Fig. 1: Intake Manifold Tightening Sequence



Retighten manifold after engine has reached normal operating temperature.

(1.5 mm) bead of RTV sealer to top of seal ends, across full width of seal.

NOTE: Manifold installation must be completed promptly after sealer application, as RTV sealer sets up in 15 minutes.

2) Position manifold gaskets and seals on engine. Install manifold, taking care not to misalign seals and gaskets. Tighten manifold attaching bolts. See *Fig. 1*.

3) Reverse removal procedure to install remaining components. Warm engine to normal operating temperature. Shut down engine and retighten manifold bolts.

CYLINDER HEAD

Removal

1) Remove intake manifold and carburetor as an assembly. Remove rocker arm covers. Loosen alternator and air pump adjusting arm bolt. Remove alternator and air pump mounting bracket bolt and spacer, and swing alternator out of way. On "E" series models, remove ignition coil.

2) Remove air cleaner inlet duct. Remove bolts from A/C bracket at front of cylinder head on all "F" series and Bronco models. Remove oil dipstick and tube. Remove speed control bracket (if equipped). Disconnect muffler inlet pipe from exhaust manifolds.

3) Loosen rocker arm fulcrum bolts, and rotate rocker arms to one side. Remove push rods in sequence, for later installation in original locations.

4) On "E" series models, remove thermactor air supply manifold, supply hose, and pump valve as an assembly. On "F" series and Bronco models, disconnect thermactor air supply hoses at check valves. Remove cylinder head bolts and cylinder heads.

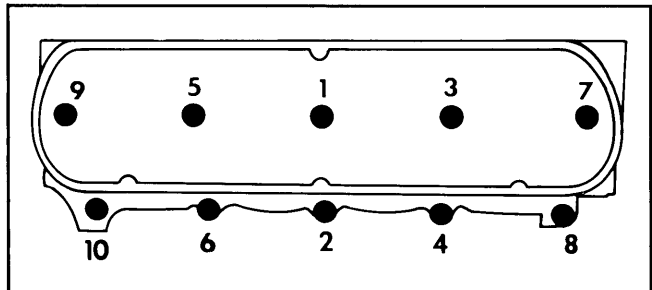
Installation

1) Clean all gasket mating surfaces. Check cylinder head and block for flatness. Position new cylinder head gasket over dowel pins on block surface.

NOTE: A specially treated composition head gasket is used. DO NOT apply sealer to gasket.

2) Position cylinder heads on block and install head bolts. Tighten 5.8L head bolts in 3 steps. Tighten 4.2L and 5.0L head bolts in 2 steps. See *Fig. 2*.

Fig. 2: Cylinder Head Tightening Sequence



Tighten 4.2L and 5.0L in 2 steps, and 5.8L in 3 steps.

3) Prior to their installation, lubricate push rod ends, valve stem tips, rocker arms and fulcrum seats with polyethylene grease (or equivalent). Reverse removal procedure to install remaining components, using new gaskets as necessary.

4.2, 5.0 & 5.8 LITER V8 (Cont.)

VALVES

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 GUIDE SERVICING

Always use reamers in proper sequence. Always reface valve seat after valve guide is reamed. After reaming operation, use a scraper to break sharp corner (ID) at top of valve guide bore. Oversize valves are available in .015" (.38 mm) and .030" (.76 mm).

VALVE STEM OIL SEALS

Cup-type oil seals are used on all valves. Lubricate valve stem with engine oil, and install new valve stem seal with cup side down over valve guide. Use a $\frac{5}{8}$ " deep-well socket and mallet to drive the oil seal onto valve stem.

VALVE SPRINGS

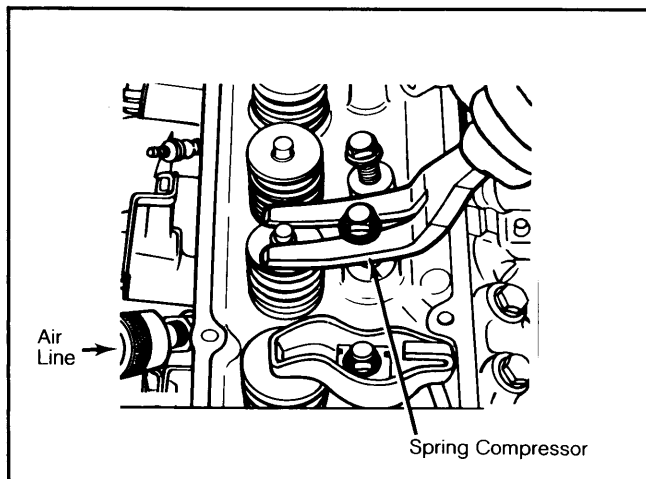
Removal

1) Remove air cleaner and rocker arm covers. Remove spark plug from cylinder to be serviced. Rotate crankshaft to bring applicable piston to TDC after compression stroke. Remove rocker arm fulcrum bolt, fulcrum, rocker arm and push rod. On exhaust valves, remove stem cap.

2) Install an air line and adapter into the spark plug hole and apply air pressure to cylinder. Install fulcrum bolt. Using valve spring compressor, compress valve spring and remove locks, retainer, sleeve, and valve spring. Remove and discard oil seal. See Fig. 3.

NOTE: Wrap a rubber band or tape around end of valve stem. This will keep valve from falling into cylinder, in the event air pressure forces piston downward.

Fig. 3: Compressing Valve Spring for Removal



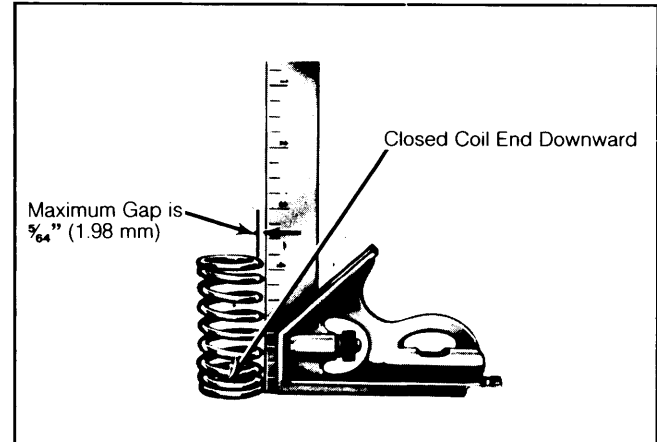
Do not remove air pressure until operation is completed.

Inspection

1) Inspect valve stem for wear and out-of-round condition. Check valve for binding in valve guide. Using valve spring tester, check springs for proper pressure. Replace springs that fail to meet specifications. See Valve Springs table.

2) Inspect each spring for squareness, using a steel square and flat surface. Observe gap between top of spring coil and square, while slowly rotating spring. Replace spring if more than $\frac{3}{64}$ " (1.98 mm) out-of-square. See Fig. 4.

Fig. 4: Checking Valve Spring Squareness

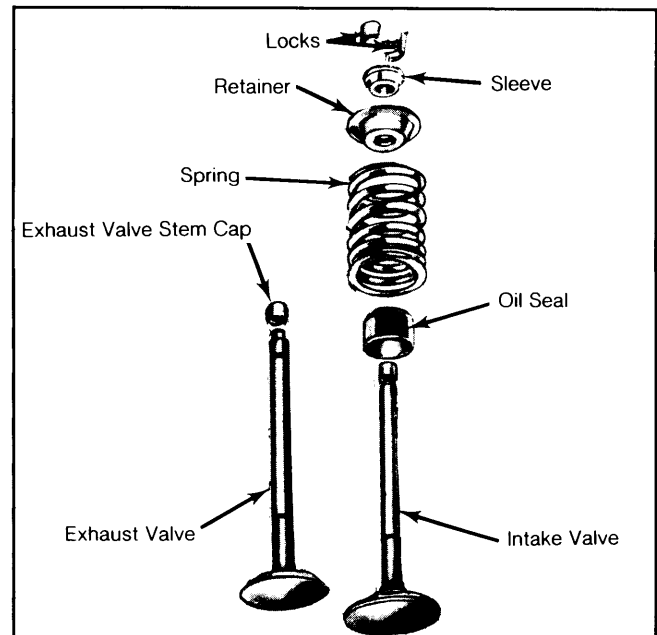


Observe gap between top of spring coil and square, while slowly rotating spring.

Installation

1) Lubricate valve stem and install valve stem oil seal. Place spring in position over valve, and install spring retainer and sleeve. Compress valve spring, and install retainer locks. See Fig. 5. Remove tool and fulcrum bolt.

Fig. 5: Exploded View of Valve Assemblies



Lubricate valve components prior to assembly.

2) Apply polyethelene grease (or equivalent) to push rod ends, valve stem tip, rocker arm and fulcrum, prior to their installation. Install valve stem caps on exhaust valves. Turn off air pressure, and remove air line and adapter. Install components in reverse order of removal procedure.

Ford V8 Engines

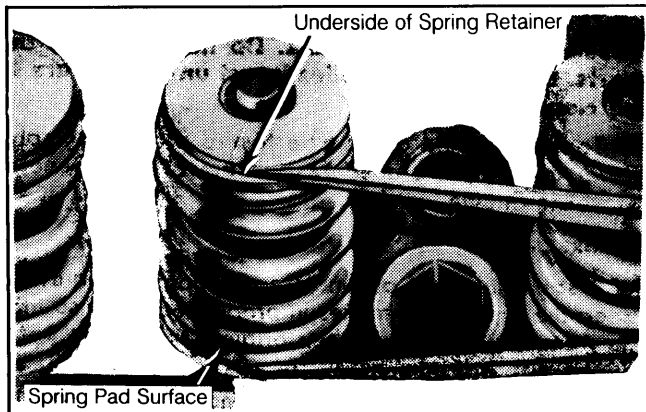
4.2, 5.0 & 5.8 LITER V8 (Cont.)

VALVE SPRING INSTALLED HEIGHT

Using dividers and a ruler, measure spring height from surface of cylinder head pad, to underside of spring retainer. See Fig. 6. If height is greater than specifications, install .030" (.76 mm) spacer(s) between head and spring to bring height within limits.

CAUTION: Install spacers only if necessary. Excessive use of spacers will overstress the valve train and cause unnecessary damage.

Fig. 6: Checking Installed Height of Valve Spring



Install .030" (.76 mm) spacer(s) to correct spring height.

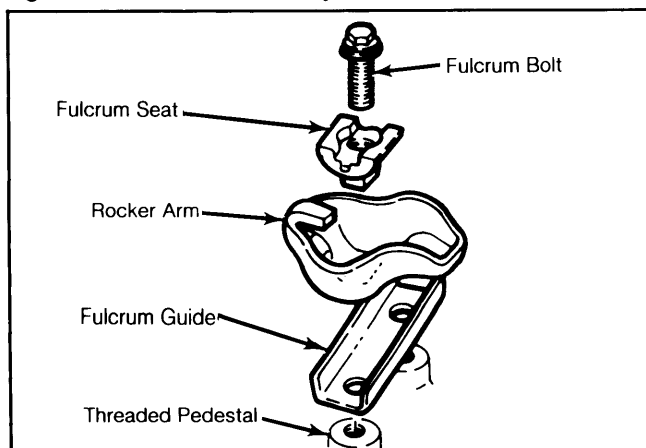
VALVE SPRING INSTALLED HEIGHT SPECIFICATIONS

| Application | Measurement In. (mm) |
|------------------------|---|
| 4.2L & 5.0L | |
| Intake | 1 ⁴³ / ₆₄ - 1 ⁴⁵ / ₆₄ (17.06-17.86) |
| Exhaust | 1 ³⁷ / ₆₄ - 1 ³⁹ / ₆₄ (14.68-15.48) |
| 5.8L | |
| Intake | 1 ⁴⁹ / ₆₄ - 1 ⁵¹ / ₆₄ (19.45-20.24) |
| Exhaust | 1 ³⁷ / ₆₄ - 1 ³⁹ / ₆₄ (14.68-15.48) |

ROCKER ARM ASSEMBLY

Inspect fulcrum bolts, fulcrums, rocker arms and fulcrum guides for abnormal or excessive wear. Coat rocker arm parts with polyethelene grease (or equivalent) prior to installation. See Fig. 7.

Fig. 7: Rocker Arm Assembly

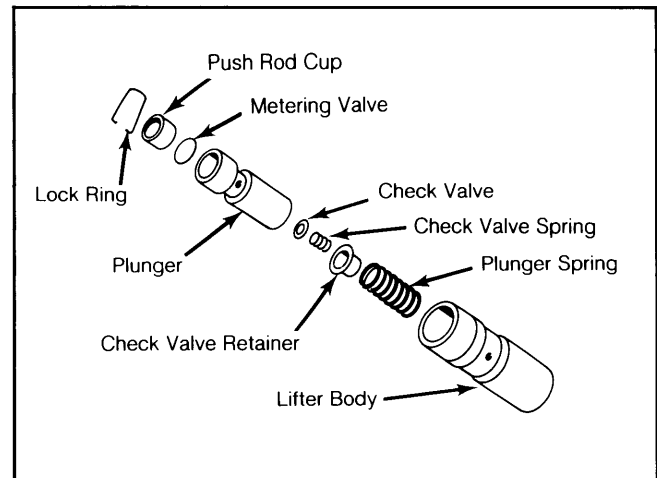


HYDRAULIC VALVE LIFTER ASSEMBLY

1) Service lifters as complete assemblies only. DO NOT interchange parts. Disassemble lifters and thoroughly clean. Reassemble lifters and test with hydraulic lifter test fluid and a lifter leak-down tester tool.

2) Leak-down rate on hydraulic lifters is 10-50 seconds at 1/16" (1.60 mm) plunger travel. See Fig. 8.

Fig. 8: Hydraulic Lifter Assembly



Parts are not interchangeable between lifters.

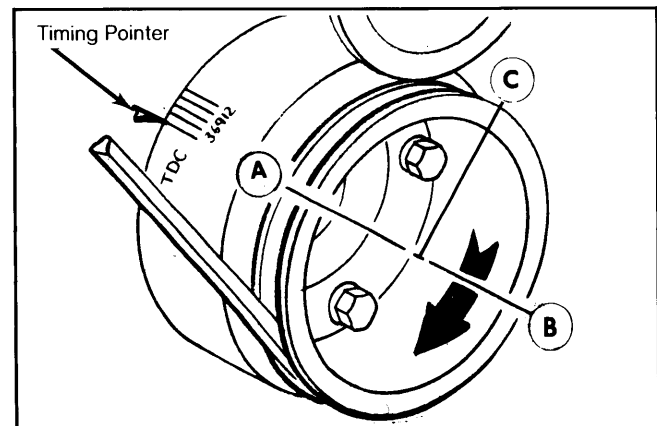
VALVE CLEARANCE ADJUSTMENT

1) Repeated valve reconditioning operations will decrease rocker arm-to-valve tip clearance. Prior to proceeding, ensure that all valve components are in a serviceable condition, properly installed, and tightened.

2) Clearance is checked by slowly bleeding down the lifter plunger of the valve being checked, using lifter compressor tool (T71P-6513-A or equivalent). The lifter plunger must be bottomed. While holding pressure on the lifter plunger, use feeler gauge to check clearance between rocker arm and valve stem tip.

3) If clearance measures less than specifications, install a .060" (1.52 mm) undersize push rod. If clearance is greater than specifications, install a .060" (1.52 mm) oversize push rod. Desired clearance is .125-.175" (3.18-4.45 mm).

Fig. 9: Marking Vibration Damper for Valve Clearance Adjustment.



Space marks approximately 90° apart.

4.2, 5.0 & 5.8 LITER V8 (Cont.)

4) With ignition switch "OFF," use a remote starter to rotate crankshaft. Rotate crankshaft until No. 1 piston is at TDC at end of compression stroke. Using TDC timing mark on vibration damper as a reference, make 2 chalk marks on vibration damper, spaced approximately 90° apart. See Fig. 9.

5) With crankshaft in positions designated in the following tables, check valve clearance between rocker arm and valve stem tip.

4.2L & 5.0L VALVE CLEARANCE ADJUSTMENT

| Crankshaft Position | Check Int. Nos. | Check Exh. Nos. |
|---------------------|-----------------|-----------------|
| A | 1, 7, 8 | 1, 5, 4 |
| B | 5, 4 | 2, 6 |
| C | 2, 3, 6 | 7, 3, 8 |

5.8L VALVE CLEARANCE ADJUSTMENT

| Crankshaft Position | Check Int. Nos. | Check Exh. Nos. |
|---------------------|-----------------|-----------------|
| A | 1, 4, 8 | 1, 3, 7 |
| B | 3, 7 | 2, 6 |
| C | 2, 5, 6 | 4, 5, 8 |

PISTONS, PINS & RINGS

OIL PAN

See Oil Pan Removal at end of ENGINE Section.

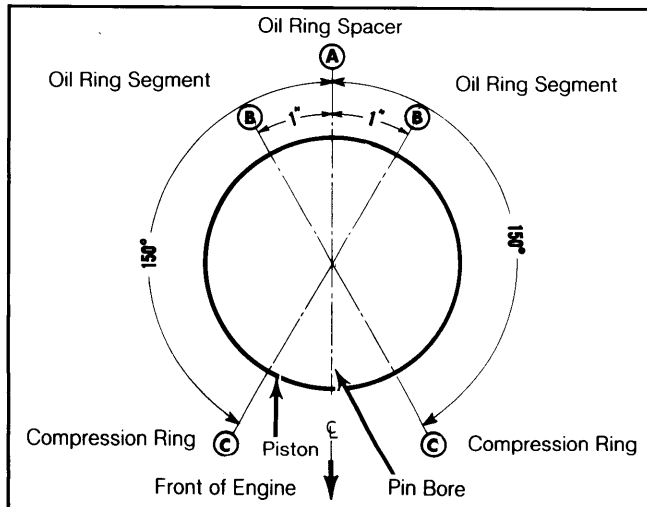
PISTON & ROD ASSEMBLY

Removal

1) Remove cylinder head, oil pan, and oil pump. Place piston at bottom of stroke, and cover with a cloth to collect cuttings. Use ridge reamer to remove any ridge or deposit on upper end of cylinder bore.

CAUTION: Never cut more than $\frac{1}{32}$ " (.79 mm) into ring travel area.

Fig. 10: Correctly Spaced Piston Rings



Space each oil ring segment 1" (25.4 mm) from oil ring spacer.

2) Ensure connecting rods and caps are marked for cylinder identification. Remove rod cap, and push piston and rod assembly out of top of cylinder bore. Take care not to damage crankshaft journal or cylinder wall. Install rod cap on rod from which removed.

Installation

1) Coat cylinder bore, piston and rings with engine oil. Ensure that ring gaps are properly spaced. See Fig. 10. Install a ring compressor on piston. Ensure position of rings does not change.

NOTE: Large chamfered side of rod's bearing end must be positioned towards crank pin thrust face of crankshaft.

2) Install each piston and rod assembly in its respective bore, with arrow (or notch) on piston head facing front of engine. Guide connecting rod onto crankshaft journal until connecting rod bearing seats on crankshaft. Install and tighten rod caps.

FITTING PISTONS

NOTE: Take measurements at normal room temperature (70°F, 21°C).

1) Measure piston at centerline of piston pin, and at 90° to piston pin axis. Measure cylinder bore 90° to crankshaft centerline, at top, middle, and bottom of bore. Use measurements to determine piston-to-cylinder bore clearance.

2) Measure cylinder bore 90° to crankshaft centerline at top of bore (below ring travel) and at bottom of bore (above ring travel). Taper is the difference between the 2 measurements, and must not exceed .010" (.25 mm).

3) Measure cylinder bore at center of piston travel, 90° to crankshaft centerline. Measure bore at center of piston travel in line with crankshaft centerline. Out-of-round is the difference between the 2 measurements, and must not exceed .005" (.13 mm).

4) If taper or out-of-round are not within limits, or cylinder walls are deeply scored, hone or bore cylinders for installation of new pistons. Check Piston Size Code Chart.

PISTON SIZE CODE CHART

| Size Code | Size In. (mm) |
|----------------------|---------------------------------|
| 4.2L | |
| Red | 3.6784-3.6790 (93.431-93.447) |
| Blue | 3.6798-3.6804 (93.467-93.482) |
| Yellow | 3.6812-3.6818 (93.502-93.518) |
| 5.0L | |
| Red | 3.9984-3.9990 (101.559-101.575) |
| Blue | 3.9996-4.0002 (101.590-101.605) |
| .003" Oversize | 4.0008-4.0014 (101.620-101.636) |
| Yellow | 4.0020-4.0026 (101.651-101.666) |
| 5.8L | |
| Red | 3.9978-3.9984 (101.544-101.559) |
| Blue | 3.9990-3.9996 (101.575-101.590) |
| .003" Oversize | 4.0002-4.0008 (101.605-101.620) |
| Yellow | 4.0014-4.0020 (101.636-101.651) |

Ford V8 Engines

4.2, 5.0 & 5.8 LITER V8 (Cont.)

PISTON PINS

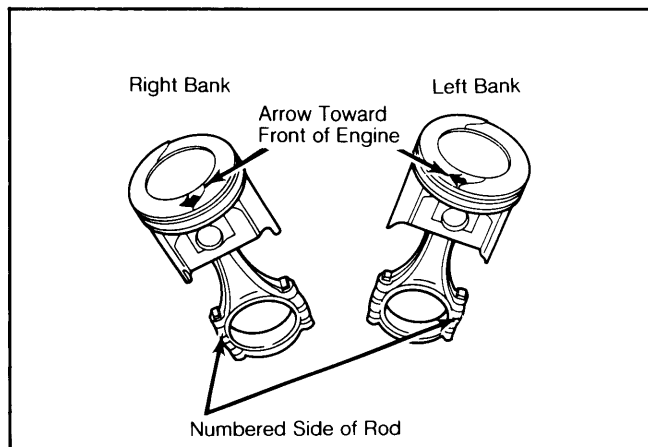
Removal

Using arbor press and piston pin removal tool (T68P-6135-A or equivalent), press piston pin from piston and connecting rod.

Installation

Lightly coat all parts to be assembled with engine oil. Position piston to connecting rod as shown in Fig. 11. Start piston pin in piston and connecting rod. Using arbor press and pin installing tool (T68P-6135-A or equivalent), press pin through piston and connecting rod until pin is centered in connecting rod.

Fig. 11: Correct Positioning of Piston to Connecting Rod



Position large chamfered side of rod's bearing end towards crank pin thrust face of crankshaft.

FITTING RINGS

1) Position ring in cylinder bore at a point where normal ring wear is not present. Exercise care not to damage ring or cylinder bore. Ring must be square in bore. Check ring end gap with a feeler gauge.

2) Check side clearance of compression rings, with feeler gauge inserted between ring and its lower land. Feeler gauge should slide freely around entire circumference of piston without binding. If lower lands have high steps, replace the piston.

CRANKSHAFT & ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

NOTE: Use Plastigage method for checking bearing clearances. Following procedures are performed with oil pan and oil pump removed. Oil film should be removed from surfaces to be checked.

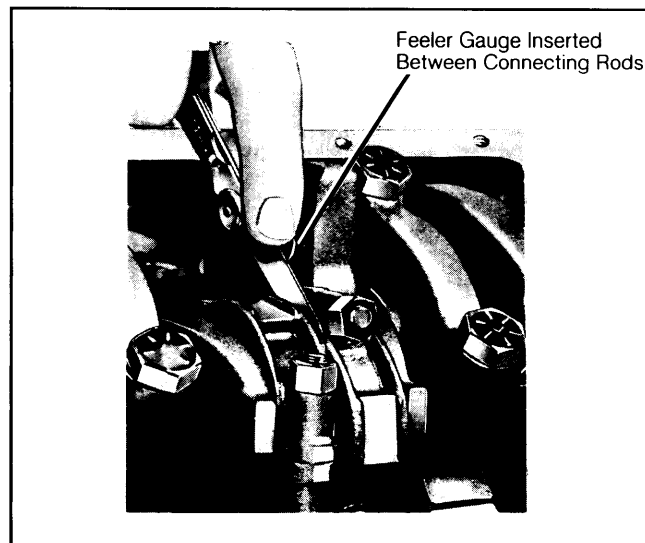
Connecting Rod Bearings

1) Ensure rod caps are marked for cylinder identification. Place crankshaft journal of cylinder to be checked at bottom of stroke and remove rod cap.

2) Place strip of Plastigage on bearing surface over full width of cap about 1/4" (6 mm) off center, and away from oil holes. Install cap and tighten to specifications. Do not allow crankshaft to turn.

3) Remove cap and measure width of Plastigage with scale furnished. To obtain proper bearing clearance, a standard bearing may be used in combination with a .001" (.025 mm) or .002" (.051 mm) undersize bearing. Check connecting rod side clearance after bearings and rod caps have been installed. See Fig. 12.

Fig. 12: Measuring Connecting Rod Side Clearance.



Side clearance is .010-.020" (.25-.51 mm).

Main Bearings

1) Fit main bearings 1 at a time, while leaving other bearings securely fastened. Make sure main bearing caps are marked for identification. Remove main bearing cap. Support crankshaft weight, using a jack placed under counterweight next to the bearing being checked.

2) Use Plastigage method (as explained in Connecting Rod Bearings) to measure main bearing clearance, tightening caps to specifications.

3) Standard size bearings may be used in combination with a .001" (.025 mm) or .002" (.051 mm) undersize bearing. If .002" (.051 mm) undersize main bearings are used on more than 1 journal, bearings must be installed in cylinder block side of crankshaft journal.

4) Replace main bearing sets 1 at a time, while leaving other bearings securely fastened. Remove bearing cap to which new bearings are to be installed.

5) Insert upper bearing remover/installer tool (6331 or equivalent) into crankshaft journal oil hole. Turn crankshaft in direction of engine rotation, forcing upper bearing out of block.

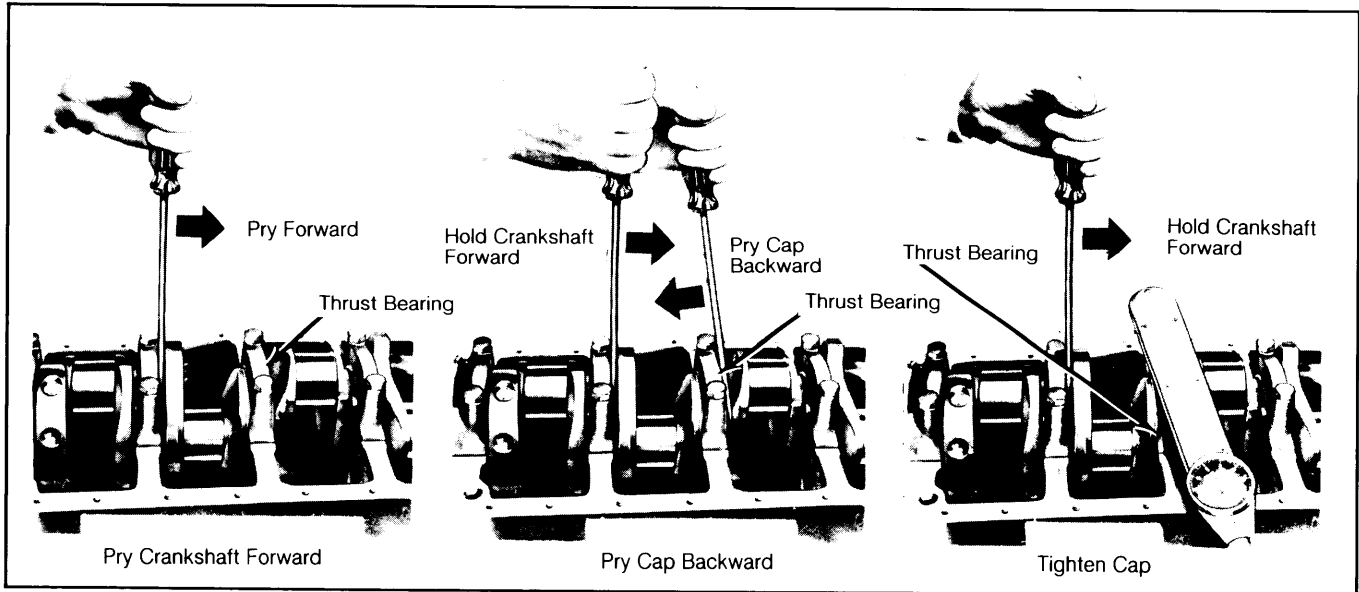
6) Lightly oil bearing and journal surfaces. Partially install plain end of upper bearing in place. Insert tool (6331 or equivalent) into journal oil hole. Turn crankshaft slowly in opposite direction of engine rotation, until bearing is seated. Remove tool. Install and tighten main bearing cap.

THRUST BEARING ALIGNMENT

Install thrust bearing cap after all other main bearing caps have been tightened. Install thrust bearing cap bolts finger tight. Pry crankshaft forward against thrust surface of upper half of bearing. Hold crankshaft forward, and pry thrust bearing cap to rear. Tighten cap bolts, while retaining forward pressure on crankshaft. See Fig. 13.

4.2, 5.0 & 5.8 LITER V8 (Cont.)

Fig. 13: Aligning Thrust Bearing



Align thrust bearing after all other bearings have been tightened.

REAR MAIN BEARING OIL SEAL

Removal

1) Remove oil pan and oil pump. Loosen all main bearing cap bolts to slightly lower crankshaft. Do not lower more than $\frac{1}{32}$ " (.79 mm).

2) Remove rear main bearing cap, and remove lower oil seal half. Use seal removing tool to remove upper seal. If tool is not available, install a small metal screw in one end of the seal, and pull on screw to remove seal. Use care not to damage crankshaft seal surface.

3) If equipped, remove and discard oil seal retaining pin from bearing cap. The pin is not used with the split-lip type replacement oil seal.

Installation

1) Carefully clean oil seal grooves in bearing cap and block. Dip split-lip seal halves in engine oil. Carefully install upper seal into groove in cylinder block, with lip (undercut side) toward front of engine.

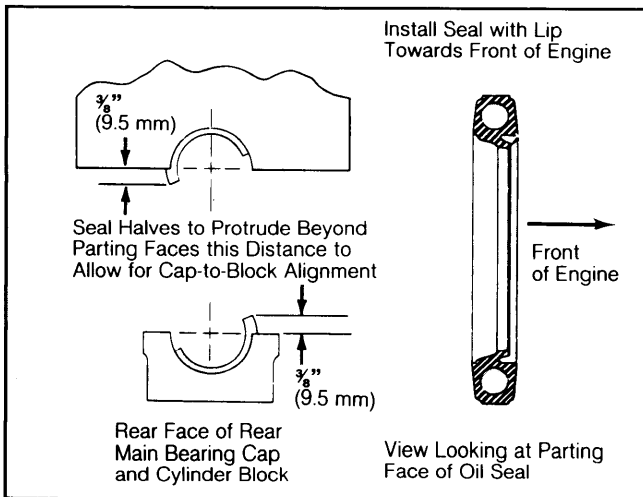
CAUTION: When installing seal in groove, avoid shaving any rubber from outside diameter of seal. Do not allow oil to get onto area where sealer will be applied.

2) Rotate seal on crankshaft journal until approximately $\frac{3}{8}$ " (9.5 mm) of seal protrudes below parting surface. See Fig. 14.

3) Tighten all other bearing cap bolts. Install lower seal in rear main bearing cap, with undercut side of seal toward front of engine. Allow seal to protrude approximately $\frac{3}{8}$ " above parting surface, to mate with upper seal when cap is installed.

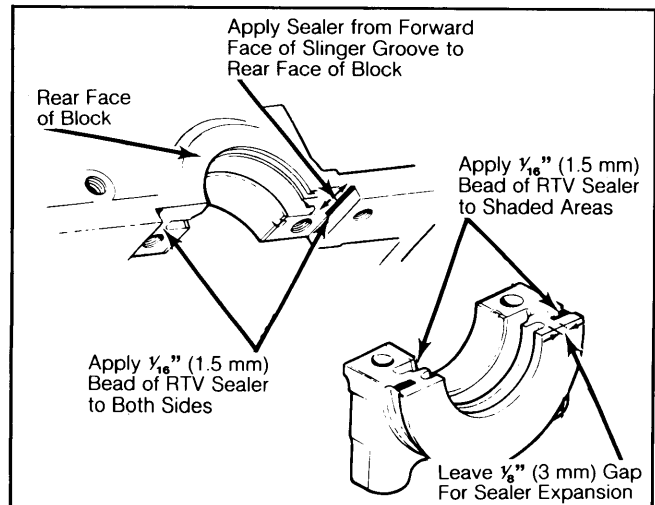
4) Apply $\frac{1}{16}$ " (1.5 mm) bead of silicone sealer to both sides of cylinder block-to-cap mating surface, and to both sides of bearing cap. See Fig. 15. Install and tighten rear main bearing cap before sealer sets up (approximately 15 minutes). Install oil pump and pan.

Fig. 14: Installing Rear Main Bearing Oil Seal



Use care not to damage crankshaft or new oil seal.

Fig. 15: Silicone Sealer Application Points



Do not allow sealer to contact lip of seal.

Ford V8 Engines

4.2, 5.0 & 5.8 LITER V8 (Cont.)

CAMSHAFT

ENGINE FRONT COVER

Removal

1) Remove air cleaner and duct assembly. Drain cooling system and crankcase. Remove fan shroud and position over fan. Remove A/C idler pulley and bracket (if equipped). Remove all hoses and brackets attached to water pump. On "E" series models, remove radiator. Remove all drive belts, fan, spacer, pulley and shroud.

2) On EEC vehicles, remove coil and bracket from water pump. Remove crankshaft pulley and vibration damper. Remove fuel pump. Remove oil pan-to-front cover bolts and cut oil pan gasket flush with cylinder block. Remove front cover and water pump as an assembly.

Installation

1) Clean all gasket surfaces. Install new front cover oil seal. Cut and fit new oil pan gasket. Apply sealer to oil pan gasket surface and install new gasket. Install oil pan front seal. Coat block and front cover with gasket sealer and position new gasket on block. Place front cover on cylinder block.

2) Install front cover oil seal alignment tool (T61P-6019-B or equivalent). Coat front cover bolts with oil resistant sealer, and install bolts. Tighten oil pan-to-front cover bolts, while pushing in on alignment tool. Install and tighten front cover bolts. Remove tool. Reverse removal procedure to install remaining components.

FRONT COVER OIL SEAL

NOTE: Front cover oil seal may be replaced without removing front cover. Use seal removing tool (T70P-6B070-B) and seal installing tool (T70P-6B070-A).

Removal

Remove front cover. Using pin punch, drive out old seal taking care not to damage front cover seal recess.

Installation

Coat new seal with Lubriplate (or equivalent). Using seal installing tool, drive seal into front cover recess. Check that seal is fully seated and spring is properly positioned in seal. Reassemble in reverse order of removal.

TIMING CHAIN

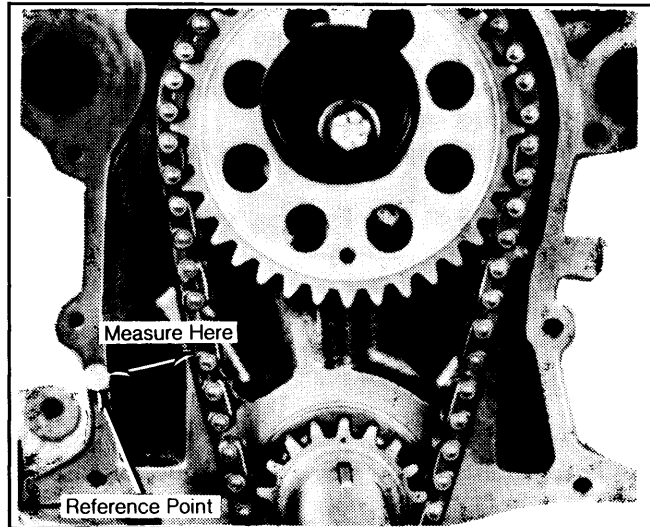
NOTE: The following procedures are performed with engine front cover removed.

Checking Timing Chain Deflection

1) Rotate crankshaft counterclockwise (as viewed from front of engine), to take up slack on left side of timing chain. Establish a reference point on the block, and measure from this point to left side of chain. See Fig. 16.

2) Rotate crankshaft clockwise to take up slack on right side of chain. Force left side of chain outward and measure distance between reference point and chain. Deflection is the difference between the 2 measurements. If deflection exceeds $\frac{1}{2}$ " (12.7 mm), replace timing chain and sprockets.

Fig. 16: Measuring Timing Chain Deflection

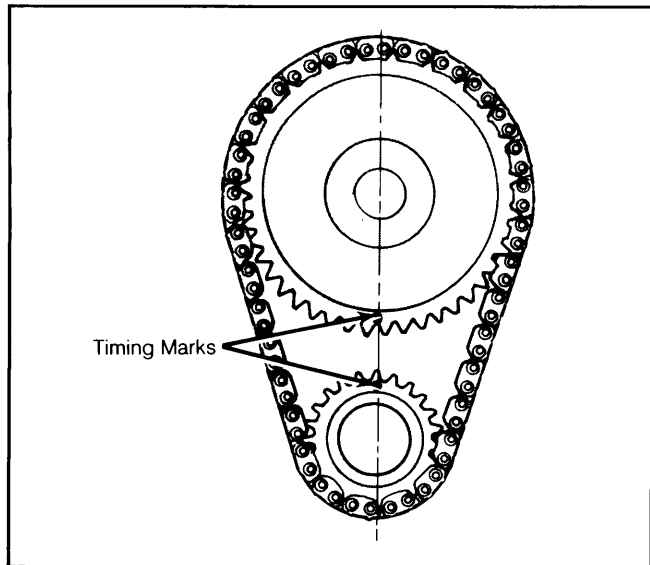


Maximum deflection is $\frac{1}{2}$ " (12.7 mm).

Removal

Crank engine until timing marks are aligned. See Fig. 17. Remove camshaft sprocket bolt, washers and fuel pump eccentric. Remove both sprockets and timing chain as an assembly.

Fig. 17: Aligning Timing Marks



Remove and install chain and sprockets as an assembly.

Installation

Position timing chain and sprockets with timing marks aligned, and slide onto crankshaft and camshaft as an assembly. Install fuel pump eccentric, washers and camshaft sprocket bolt, and tighten bolt. Lubricate fuel pump eccentric and timing chain and sprockets with heavy engine oil. Install front cover.

CAMSHAFT

Removal

1) Remove grille on "E" series models. Drain cooling system and crankcase. Remove radiator, front

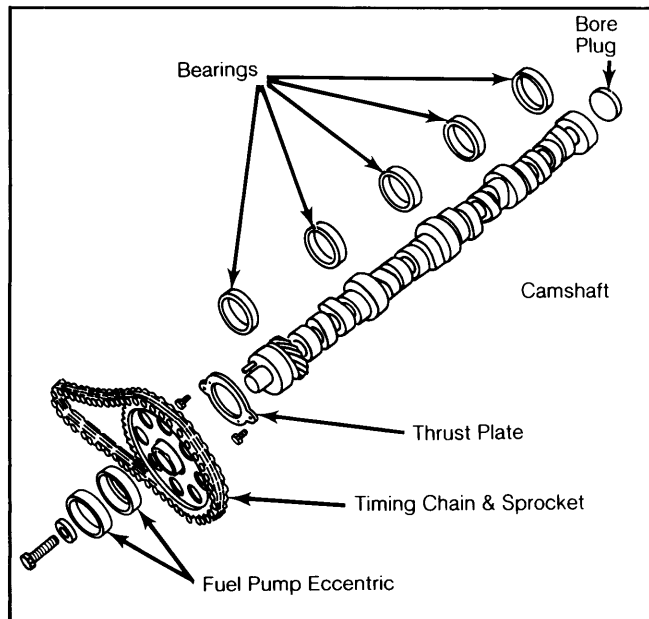
4.2, 5.0 & 5.8 LITER V8 (Cont.)

cover, timing chain and sprockets. Remove intake manifold and carburetor as an assembly.

2) Remove valve covers. Loosen rocker arm fulcrum bolts, and rotate rocker arms to one side. Remove push rods and valve lifters in sequence so as to return to original locations.

3) Remove camshaft thrust plate, and carefully pull camshaft out through front of engine. Use care to avoid damage to camshaft bearings and journals. See Fig. 18.

Fig. 18: Camshaft Assembly



Install thrust plate with groove toward cylinder block.

Installation

1) Oil camshaft journals, and apply polyethylene grease (or equivalent) to lobes. Carefully slide camshaft into position. Coat camshaft thrust plate with engine oil, and install with the groove toward cylinder block.

2) Lubricate lifters with heavy engine oil, and install. Lubricate rocker arms, fulcrum seats, valve stem tips and push rod ends with polyethylene grease (or equivalent) prior to installing. Reassemble engine in reverse order of removal procedures, using new gaskets. Check valve clearance.

CAMSHAFT BEARINGS

NOTE: Camshaft bearings are not interchangeable from one bore to another.

Removal

Camshaft bearings are replaced with engine removed from vehicle. Remove camshaft, flywheel, crankshaft, and rear bearing bore plug. Push pistons to top of cylinders. Using camshaft bearing installer/remover tool, remove camshaft bearings.

Installation

Using camshaft bearing installer/remover tool, install bearings into place. Make sure oil holes are properly aligned in each bore. Install front bearing .005-.020" (.13-.51 mm) rearward of front face of cylinder block. Install new rear bearing bore plug.

CAMSHAFT END THRUST

CAUTION: Do not pry against camshaft sprocket, without first relieving the valve train load on the camshaft.

1) Loosen rocker arm fulcrum bolts to relieve load on camshaft. Push camshaft toward rear of engine, and install dial indicator. Position indicator point on camshaft sprocket attaching bolt. Zero dial indicator.

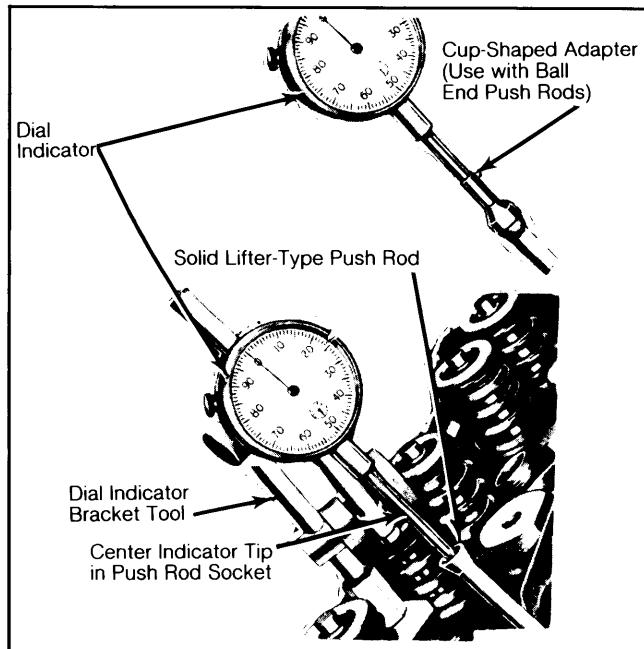
2) Place a large screwdriver between camshaft sprocket and cylinder block. Pull camshaft forward and release. If dial indicator reading shows excessive end play, replace thrust plate.

CAM LOBE LIFT

1) Remove rocker arm cover, fulcrum bolt, fulcrum seat, rocker arm and fulcrum guide. Make sure push rod end is in valve lifter socket. Install a remote starter switch to rotate crankshaft.

2) Use a dial indicator to check lobe lift in consecutive order. Position dial indicator point (or cup-shaped adapter) on end of push rod (in same plane as push rod movement). See Fig. 19.

Fig. 19: Checking Camshaft Lobe Lift



Make sure push rod is in valve lifter socket.

3) Rotate crankshaft until lifter and push rod are at lowest position. Zero dial indicator. Rotate crankshaft slowly until push rod is in fully raised position. Record dial indicator reading and compare with specifications.

4) Maximum allowable lift loss is .005" (.13 mm). If lift on any lobe is below specifications, replace camshaft and valve lifter operating on worn lobe(s).

ENGINE OILING

Crankcase Capacity

Capacity is 5 quarts (4.75L). Add 1 quart (.95L) with filter change.

Ford V8 Engines

4.2, 5.0 & 5.8 LITER V8 (Cont.)

Oil Filter

Full-flow filter has an integral by-pass valve. An anti-drainback feature prevents reverse flow of oil when the engine is shut down. Replace filter at first oil change, then every second oil change thereafter.

Normal Oil Pressure

40-60 psi (2.8-4.2 kg/cm²) at 2000 RPM.

Pressure Regulator Valve

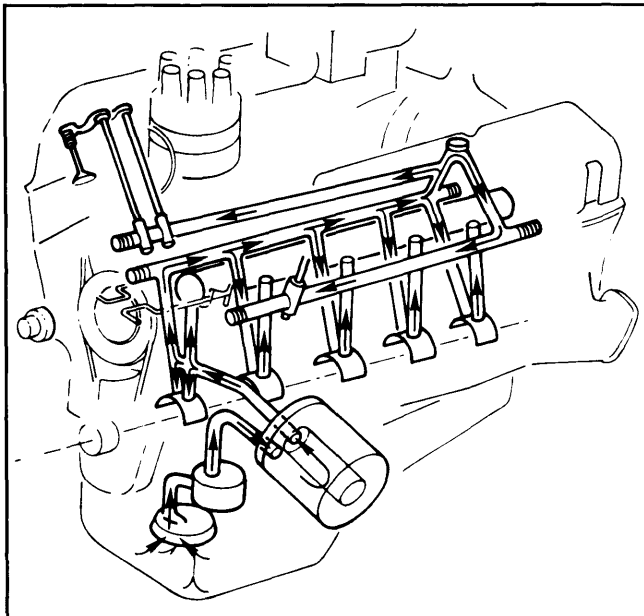
Valve located in pump body, not adjustable.

ENGINE OILING SYSTEM

System is pressure fed from rotor-type oil pump. Oil flows through full-flow oil filter before entering main oil gallery. Oil from main gallery enters main bearings and camshaft bearings. Drilled oil holes in crankshaft provides lubrication to rod bearings.

Oil moves through secondary drilled passages to lifters. From there it is routed through hollow push rods up to top of head assembly to lubricate rocker arms. Oil is returned to oil pan through drain holes in cylinder heads. See Fig. 20.

Fig. 20: Engine Oiling System



OIL PUMP

Removal

Remove oil pan. Remove nut securing oil pump inlet tube and screen to engine. Remove oil pump attaching bolts and intermediate drive shaft. Remove oil pump assembly.

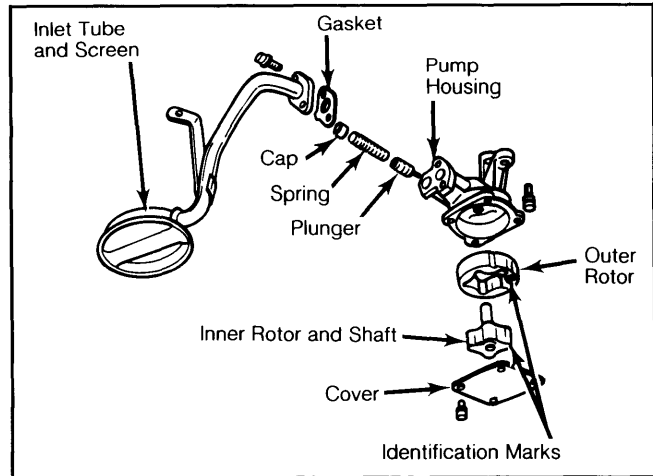
Disassembly

1) Remove oil pump inlet tube. Remove cover attaching bolts and cover. Remove inner rotor and shaft and outer rotor.

2) Drill small hole into oil pressure relief valve cap. Insert self-threading sheet metal screw into cap, and pull cap from chamber. Remove spring and plunger. See Fig. 21.

NOTE: If any part of the oil pump requires replacement, the complete pump assembly must be replaced.

Fig. 21: Oil Pump Assembly



Dimple on outer rotor must face same side as identification mark on inner rotor.

Inspection

1) Wash all parts thoroughly, and dry with compressed air. Check inside of pump housing, outer rotor, and inner rotor and shaft for damage, scoring or excessive wear. Check mating surface of pump cover for wear, scoring or grooved condition.

2) Remove rotor assembly from pump housing. Using feeler gauge, measure inner to outer rotor tip clearance. Install rotor assembly in pump housing. Lay a straightedge over rotor assembly and housing. Insert feeler gauge between straightedge and housing to measure rotor end play.

3) Measure outer rotor-to-housing clearance, using feeler gauge. Measure the shaft outside diameter and the housing bearing inside diameter. Difference between readings is the shaft-to-housing bearing clearance.

4) Relief valve spring should test to 10.6-12.2 lbs. (5-5.5 kg) at 1.74" (44.2 mm) for 4.2L and 5.0L engines; and 18.2-20.2 lbs. (8-9 kg) at 2.49" (63.3 mm) for 5.8L engines.

5) Inspect relief valve spring for worn or collapsed condition. Check relief valve plunger for scores and for free operation in bore. Check clearance between relief valve plunger and bore.

OIL PUMP SPECIFICATIONS

| Application | Specification In. (mm) |
|----------------------------------|---------------------------|
| Rotor Tip Clearance | .012 (.30) Max. |
| Rotor End Play | .004 (.10) Max. |
| Outer Rotor-to-Housing Clearance | .001-.013 (.03-.33) |
| Shaft-to-Housing Clearance | .0015-.0030 (.038-.076) |
| Relief Valve-to-Bore Clearance | .0015-.0030 (.038-.076) |

Reassembly

Clean and oil all parts thoroughly. Install relief valve plunger, spring and new cap. Stake cap into position. Install remaining components in reverse order of disassembly, using new gasket for oil inlet tube.

4.2, 5.0 & 5.8 LITER V8 (Cont.)

Installation

1) Prime oil pump by filling inlet opening with oil and rotating pump shaft until oil emerges from outlet opening. Firmly seat intermediate shaft into distributor socket. The stop on the shaft should touch roof of crankcase. Position stop on shaft as necessary.

2) Remove shaft and insert into oil pump. Install and tighten shaft and pump as an assembly.

CAUTION: If pump and shaft do not readily seat, do not force into position. Realign drive shaft hex with distributor shaft socket, and reinstall.

ments, see appropriate article in "Engine Cooling Systems" at end of ENGINE Section.

ENGINE COOLING

WATER PUMP

Removal

1) Remove air cleaner and duct assembly. Drain cooling system. Remove fan shroud and position over fan. Remove A/C idler pulley and bracket (if equipped).

2) Remove all hoses and brackets attached to water pump (including coil and bracket, on EEC-equipped vehicles). On "E" Series models, remove radiator. Remove all drive belts, fan, spacer, pulley and shroud.

Installation

Clean all gasket mating surfaces. Transfer fittings to new pump (if required). Coat new gasket on both sides with gasket sealer, and position on cylinder front cover. Install water pump and tighten attaching bolts. Reverse removal procedure to install remaining components.

NOTE: For further information on cooling system capacities and other cooling system components,

TIGHTENING SPECIFICATIONS

| Application | Ft. Lbs. (N.m) |
|----------------------------|-------------------|
| Camshaft Thrust Plate Bolt | 9-12 (12-16) |
| Camshaft Sprocket Bolt | 40-45 (54-61) |
| Connecting Rod Cap Nuts | |
| 4.2L & 5.0L | 19-24 (26-33) |
| 5.8L | 40-45 (54-61) |
| Cylinder Head Bolts | |
| 4.2L & 5.0L | |
| Step 1 | 55-65 (75-88) |
| Step 2 | 65-72 (88-98) |
| 5.8L | |
| Step 1 | 85 (115) |
| Step 2 | 95 (129) |
| Step 3 | 105-112 (142-152) |
| Engine Front Cover Bolts | 12-18 (16-24) |
| Exhaust Manifold Bolts | 18-24 (24-33) |
| Flywheel Bolts | 75-85 (102-115) |
| Intake Manifold Bolts | 23-25 (31-34) |
| Main Bearing Cap Bolts | |
| 4.2L & 5.0L | 60-70 (81-95) |
| 5.8L | 95-105 (129-142) |
| Oil Filter Adapter | 20-30 (27-40) |
| Oil Pump Attaching Bolts | 22-32 (30-43) |
| Rocker Arm Cover Bolts | 3-5 (4-7) |
| Rocker Arm Fulcrum Bolt | 18-25 (24-34) |
| Vibration Damper Bolt | 70-90 (95-122) |
| Water Pump Bolts | 12-18 (16-24) |

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

| Year | Displ. | | Carburetor | HP at RPM | Torque Ft. Lbs. @ RPM | Compr. Ratio | Bore | | Stroke | |
|------|----------|--------|------------|-----------|--------------------------|-----------------|------|-------|--------|------|
| | cu. ins. | liters | | | | | in. | mm | in. | mm |
| 1982 | 225 | 4.2 | 2-Bbl. | | | | 3.68 | 93.5 | 3.00 | 76.2 |
| | 302 | 5.0 | 2-Bbl. | | | | 4.00 | 101.6 | 3.00 | 76.2 |
| | 351 | 5.8 | 2-Bbl. | | | | 4.00 | 101.6 | 3.50 | 88.9 |

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) |
|----------------|------------------------------|------------------------------|------------|------------------------|------------------------------|------------------------------|----------------------------|
| 4.2L Int. | 1.770-1.794 (44.96-45.57) | 44° | 45° | .060-.080 1.52-2.03 | .3416-.3423 (8.677-8.694) | .0010-.0027 (.038-.081) | .3753 (9.533) |
| | Exh. | 1.453-1.468 (36.91-37.29) | 44° | 45° | .060-.080 1.52-2.03 | .3411-.3418 (8.664-8.682) | .0015-.0032 (.027-.069) |
| 5.0L Int. | | 1.770-1.794 (44.96-45.57) | 44° | 45° | .060-.080 1.52-2.03 | 34.16-.3423 (8.677-8.694) | .0010-.0027 (.038-.081) |
| | Exh. | 1.453-1.468 (36.91-37.29) | 44° | 45° | .060-.080 1.52-2.03 | .3411-.3418 (8.664-8.682) | .0015-.0032 (.027-.069) |
| 5.8L Int. | | 1.770-1.794 (44.96-45.57) | 44° | 45° | .060-.080 1.52-2.03 | .3416-.3423 (8.677-8.694) | .0010-.0027 (.038-.081) |
| | Exh. | 1.453-1.468 (36.91-37.29) | 44° | 45° | .060-.080 1.52-2.03 | .3411-.3418 (8.664-8.682) | .0015-.0032 (.027-.069) |

Ford V8 Engines

4.2, 5.0 & 5.8 LITER V8 (Cont.)

ENGINE SPECIFICATIONS (Cont.)

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) |
| 4.2L | .0014-.0024 (.036-.061) | .0003-.0005 (.008-.013) | Press Fit | 1 & 2 | .010-.020 (.25-.51) | .002-.004 (.05-.10) |
| | | | | 3 | .015-.055 (.38-1.40) | Snug Fit |
| 5.0L | .0018-.0026 (.046-.066) | .0002-.0004 (.005-.010) | Press Fit | 1 & 2 | .010-.020 (.25-.51) | .002-.004 (.05-.10) |
| | | | | 3 | .015-.055 (.38-1.40) | Snug Fit |
| 5.8L | .0018-.0026 (.046-.066) | .0003-.0005 (.008-.013) | Press Fit | 1 & 2 | .010-.020 (.25-.51) | .002-.004 (.05-.10) |
| | | | | 3 | .015-.055 (.38-1.40) | Snug Fit |

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) |
| 4.2L | 2.2482-2.2490 (57.104-57.125) | .0005-.0015 (.013-.038) | No. 3 | .004-.008 (.10-.20) | 2.1228-2.1236 (53.919-53.939) | .0008-.0015 (.020-.038) | .010-.020 (.25-.51) |
| 5.0L | 2.2482-2.2490 (57.104-57.125) | .0005-.0015 (.013-.038) | No. 3 | .004-.008 (.10-.20) | 2.1228-2.1236 (53.919-53.939) | .0008-.0015 (.020-.038) | .010-.020 (.25-.51) |
| 5.8L | .29994-3.0002 (76.185-76.205) | .0008-.0015 (.020-.038) | No. 3 | .004-.008 (.10-.20) | 2.3103-2.3111 (58.682-58.702) | .0008-.0015 (.020-.038) | .010-.020 (.25-.51) |

CAMSHAFT

| Engine | Journal In. (mm) | Clearance In. (mm) | Lobe Lift In. (mm) |
|-----------------------------------|----------------------------------|------------------------|-----------------------|
| 4.2L, 5.0L & 5.8L ¹ | | | |
| No. 1 | 2.0805-2.0815 (52.845-52.870) | .001-.003 (.03-.08) | ² |
| No. 2 | 2.0655-2.0665 (52.464-52.489) | | ³ |
| No. 3 | 2.0505-2.0515 (52.083-52.108) | | ⁴ |
| No. 4 | 2.0355-2.0365 (51.702-51.727) | | |
| No. 5 | 2.0205-2.0215 (51.321-51.346) | | |

VALVE SPRINGS

| Engine | Free Length In. (mm) | PRESSURE Lbs. @ In. (kg @ mm) | |
|-------------|-------------------------|-------------------------------------|------------------------------|
| | | Valve Closed | Valve Open |
| 4.2L & 5.0L | Int. | 74-82@1.78 (34-37@45.2) | 196-214@1.36 (89-97@34.5) |
| | Exh. | 71-79@1.60 (32-36@40.6) | 195-215@1.15 (88-98@29.2) |
| 5.8L | Int. | 74-82@1.78 (34-37@45.2) | 194-214@1.33 (88-97@33.8) |
| | Exh. | 71-79@1.60 (32-36@40.6) | 195-215@1.15 (88-98@29.2) |

¹ — End play is .001-.007" (.03-.18mm).

² — 4.2L Int. & Exh. is .2375" (6.033 mm).

³ — 5.0L Int. is .2375" (6.033 mm); Exh. is .2474" (6.284 mm).

⁴ — 5.8L Int. & Exh. is .2780" (7.061 mm).