4.2L 6-CYLINDER ENGINE

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engine code is stamped on a machined surface on right side of engine block between No. 2 and No. 3 cylinders. The code numbers identify the month, day, and year of engine manufacture. The code letter identifies engine displacement (cu. in.), carburetor type, and compression ratio.

Engine Identification Codes

Application	Code
4.2L (258") 2 Bbl.	C

SPECIAL ENGINE MARKS

Some engines are produced at factory with oversize or undersize components. These engines are identified by a letter code stamped on a boss between ignition coil and distributor. Letters are decoded as follows:

B – All cylinder bores .010" oversize.
C – All camshaft bearing bores .010" oversize.
M – All main bearing journals .010" undersize.
P – All connecting rod journals .010" undersize.

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

INTAKE & EXHAUST MANIFOLDS

Removal – 1) Remove air cleaner. Disconnect fuel pipe, carburetor air horn vent hose, choke heater wire, and solenoid wire (if equipped). Disconnect throttle cable from throttle bellcrank. If equipped, disconnect throttle valve rod. Disconnect PCV vacuum hose and heater wire from manifold.

2) Drain coolant and remove hoses from intake manifold. Disconnect vacuum hoses from spark CTO valve and EGR valve. Disconnect EGR tube fittings from intake and exhaust manifolds.

3) Disconnect air injection hoses at air pump and air injection manifold check valve. Disconnect diverter valve vacuum hose and remove diverter valve with hoses attached. Remove air pump and if equipped, remove power steering pump with hoses attached. Remove air pump/power steering mounting bracket.

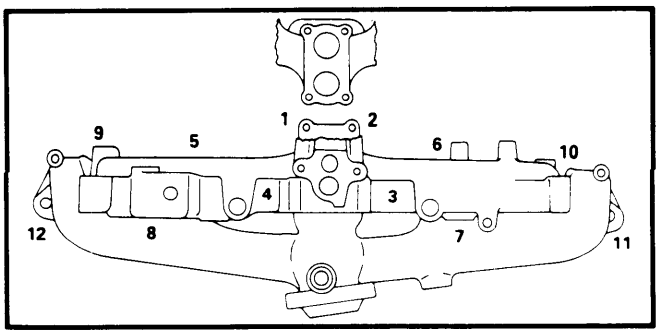

Fig. 1 Manifold Tightening Sequence

4) If equipped with air conditioning, remove drive belt idler pulley. Disconnect exhaust header pipe. Remove oxygen sensor if equipped. Remove manifold attaching nuts and remove manifold.

Installation – 1) Clean mating surfaces of manifolds and cylinder head. Position exhaust manifold and positioning sleeves over end studs. Secure exhaust manifold to cylinder head at positions 1 and 2, tighten bolts to 23 ft. lbs, and remove positioning sleeves. *See Fig. 1.*

2) Loosely connect EGR tube to intake manifold. Position intake manifold gasket over dowels and flush against cylinder head. Fit intake manifold over dowels and flush against gasket. Loosely connect EGR tube to exhaust manifold. Secure intake manifold at positions 3 and 4 and tighten bolts to 23 ft. lbs.

3) Install remaining nuts and bolts and tighten in sequence as shown in *Fig. 1.* To complete installation, reverse removal procedures.

CYLINDER HEAD

NOTE – *Rocker arm cover is made of molded plastic. Extreme care must be used when removing and installing to prevent it from cracking.*

Removal – 1) Drain cooling system and disconnect radiator hose at thermostat housing. Remove rocker arm cover. Remove rocker arms and bridged pivot assembly by backing each screw off one turn at a time to avoid damage to bridge, then remove push rods. Remove intake and exhaust manifold assembly from cylinder head.

NOTE – *Retain push rods, bridged pivots and rocker arms in order for reinstallation in original location.*

2) If equipped with air conditioning, remove drive belt idler bracket from cylinder head. Remove compressor mounting bracket bolts and position compressor and mount off to side without disconnecting lines. Remove spark plugs and disconnect temperature sending unit wire. Disconnect battery ground cable. Remove ignition coil and bracket. Remove cylinder head bolts, cylinder head and gasket.

Installation – Clean gasket mounting surfaces of cylinder head and engine block. Apply an even coat of sealing compound to both sides of cylinder head gasket, and position on block with word "TOP" facing upward. Carefully set head in place and install bolts. Tighten bolts in sequence. *See Fig. 2.* Reverse removal procedures to complete installation.

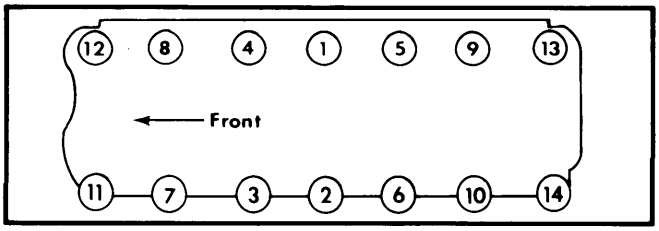

Fig. 2 Cylinder Head Tightening Sequence

VALVES

VALVE ARRANGEMENT

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

4.2L 6-CYLINDER ENGINE (Cont.)

VALVE GUIDE SERVICING

1) Valve guides are an integral part of cylinder head and are not replaceable. If stem-to-guide clearnace is excessive, use next oversize valve and ream valve guide bore to accomodate. Valves are available in .003", .015", and .030" oversize.

2) To check stem-to-guide clearance, install a valve in its guide so head is barely off seat. Place a dial indicator against top of stem and rock valve back and forth. If indicated movement is greater than .003", an oversize valve and valve guide bore reaming is necessary.

NOTE – *Ream valve guides in steps, starting with .003" oversize reamer, and progressing to size required.*

VALVE STEM OIL SEALS

A nylon valve stem oil seal is used on all valves to keep engine oil from entering combustion chambers through valve guides. Replace oil seals if deteriorated, or when valve service is performed.

NOTE – *If valves with oversize stems are used, then oversize oil seals are also required.*

VALVE SPRINGS

NOTE – *Although normal service is performed with cylinder head removed, it is possible to replace seals, keepers, retainers, or broken springs with cylinder head installed.*

Removal – 1) Remove rocker arm cover. Remove bridge and pivot assemblies, rocker arm, and push rod of valve to be serviced. Remove spark plug and install 14 mm (thread size) air adaptor in spark plug hole. Connect an air hose and maintain a constant pressure of at least 90 psi.

2) Using a valve spring compressing tool (J-22534-01 or equivalent), compress valve spring and remove locks. Remove valve spring retainer, valve spring, and oil seal.

Installation – Use a suitable valve spring tester to check each spring for tension value. Replace if necessary. To complete installation, reverse removal procedures noting the following: Use a 7/16" deep socket to lightly tap valve stem oil seals into place on valve stem. Tap each valve spring from side to side to ensure spring is seated properly.

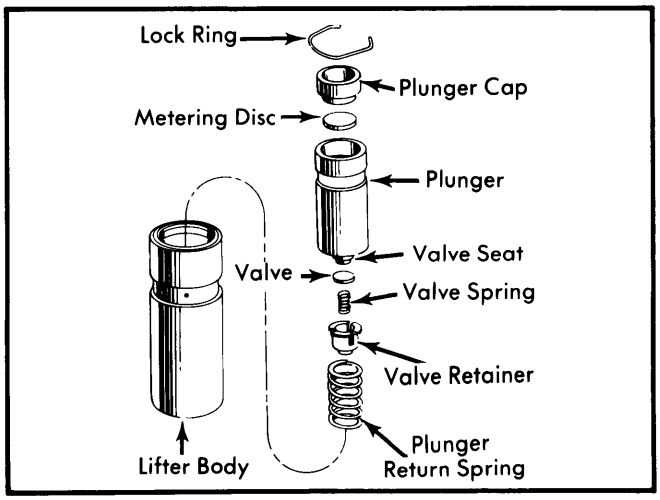

Fig. 3 Exploded View of Hydraulic Valve Lifter Assembly

HYDRAULIC VALVE LIFTER ASSEMBLY

Lifters are serviced as complete assemblies only and parts are not interchangeable between lifters. Inspect for signs of scuffing on barrel and face of tappet body. Inspect tappet face for concave wear and if present, replacement of camshaft and tappets is necessary. If lifters are disassembled for cleaning and inspection, after reassembly (see illustration for arrangement of parts), they should be tested using suitable leak-down tester according to manufacturers instructions. Leak-down should take 20-110 seconds with a load travel of .125". Discard tappets not within specifications.

NOTE – *Do not fill tappet assemblies with engine oil prior to installation as they will charge themselves within 3-8 minutes of engine operation.*

ROCKER ARM ASSEMBLY

Both intake and exhaust rocker arms for individual cylinders are on a bridged pivot connected to cylinder head by two screws. Rocker arms are removed by removing screws and lifting rocker arms and pivot from cylinder head. Mark or position rocker arms and pivots to ensure that they are installed in original position. Check pivot surface on rocker arm and pivot for wear or scoring. Check valve contact surface on rocker arm for wear or scoring. To install, reverse removal procedure.

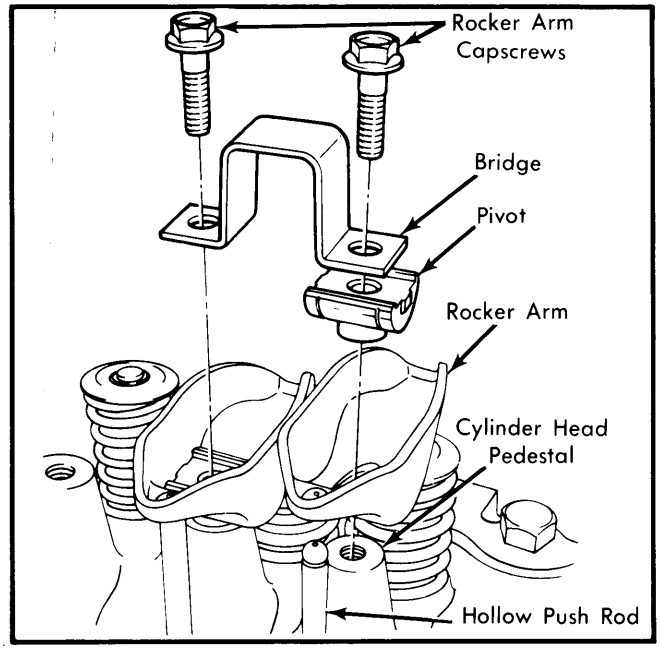

Fig. 4 Detailed View of Rocker Arm Assemblies

PISTONS, PINS & RINGS

OIL PAN

See Oil Pan Removal at end of ENGINE Section.

PISTON & ROD ASSEMBLY

NOTE – *New pistons must be installed in same cylinders for which they were fitted, and used pistons in same cylinder from which they were removed.*

4.2L 6-CYLINDER ENGINE (Cont.)

Removal – 1) With cylinder head and oil pan removed, use ridge reamer to remove any ridge or deposits on upper end of cylinder bore.

NOTE – *Piston must be at bottom of stroke and covered with cloth to collect cuttings.*

2) Remove connecting rod bearing caps and retain in same order as removed. Install rubber hose over connecting rod studs to protect cylinder walls and push piston and rod assembly out top of cylinder block.

NOTE – *Caps and rods are stamped with corresponding cylinder number.*

Installation – 1) Lightly coat pistons, rings, and cylinder walls with engine oil. Install suitable ring compressor on pistons, making sure not to change position of piston rings. With connecting rod studs covered to protect cylinder walls, install each piston and rod assembly in its respective bore with arrow pointing toward front of engine.

2) Guide connecting rod onto crankshaft journal while tapping piston head with a hammer handle to seat connecting rod against crankshaft journal. Install mating cap and tighten connecting rod cap nuts.

FITTING PISTONS

1) With piston removed, check each cylinder bore with an inside micrometer approximately 2 5/16" below top of cylinder. Using a micrometer, measure piston at right angle (90°) to piston pin at centerline of pin. Difference between cylinder bore diameter and piston diameter is piston-to-pin clearance. If clearance exceeds specifications, cylinder must be bored and oversize pistons and rings used.

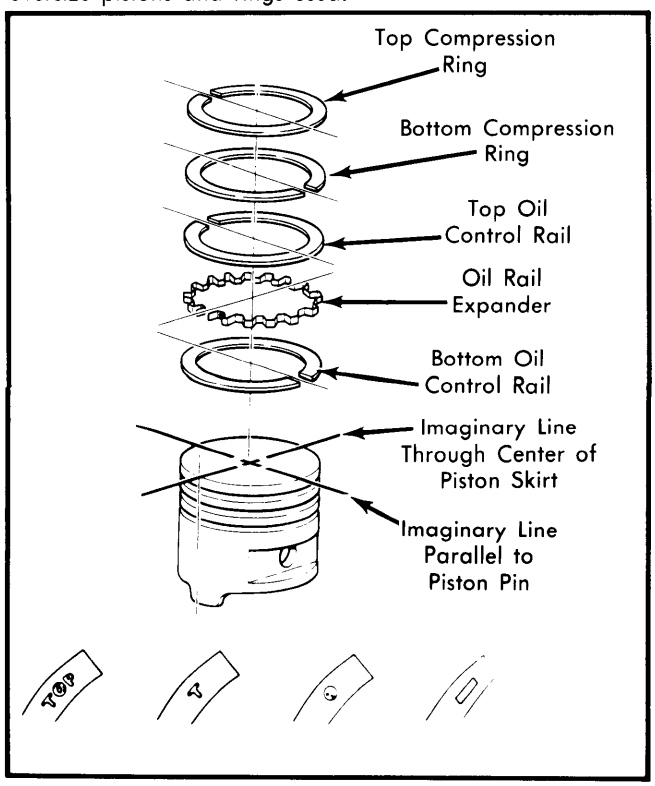

Fig. 5 Piston Ring Gap Positions and Ring Markings

2) Position a piston ring squarely at bottom end of piston ring travel in cylinder bore and check ring end gap with a feeler gauge. End gap should be .010-.020" for compression rings, and .010-.025" for oil control rings.

3) Position piston rings as shown in *Fig. 5*. Ring gaps may vary 20° from position illustrated. Make sure markings on compression rings point up. See *Fig. 5*. When installing oil control rings, insert expander ring first, then side rails. Check ring side clearance with a feeler gauge. If found to be excessive, replace piston.

PISTON PINS

Removal – 1) Using a suitable driver, arbor press and support, press piston pin completely out of piston assembly.

NOTE – *Never reuse a piston pin after it has been installed in and removed from a connecting rod.*

2) To check replacement piston pin for fit, position piston so pin bore is in a vertical position. At room temperature replacement pin should slide completely through pin bore without using force. If pin jams in bore, replace piston.

Installation – Use arbor press to press piston pin through connecting rod and piston until pin is centered in connecting rod within .031". The piston pin requires a 2000 lb. press fit. If little effort is required to install piston pin in connecting rod, or if rod moves along pin, replace connecting rod.

MAIN & CONNECTING ROD BEARINGS

CONNECTING ROD BEARINGS

Removal – With oil pan removed, rotate crankshaft as required to position 2 connecting rods at a time at bottom of stroke. Note each rod cap marking for proper replacement. Using Plastigage method, check bearings for proper clearance. Install new bearings if clearance is excessive.

Installation – 1) Rod journal size is identified in production by a color coded paint mark located on rear side of adjacent counterweight. When required, upper and lower bearing inserts of different sizes may be used as a pair to achieve desired clearance. Do not use pair of bearings with more than .001" difference in size on same journal.

2) Lubricate bearing surface of each insert with clean oil. Install bearing inserts, caps, and retaining nuts and tighten.

MAIN BEARINGS

Main bearing caps are numbered 1 to 7 front to rear, and an arrow indicates forward position. Main bearing journal size is identified in production by a color coded paint mark on adjacent cheek toward rear of crankshaft except for rear main journal, which has a paint mark on the crankshaft rear flange. When required, upper and lower bearing inserts of different sizes may be used to obtain correct bearing clearance. Do not use a pair of inserts with greater than .001" difference in size. Bearings are available in standard, .001", .002", .010", and .012" undersize. Insert size is stamped on back of each insert.

NOTE – *When replacing bearing inserts, all odd sized inserts must be either on top (in block) or on bottom (in main bearing caps).*

4.2L 6-CYLINDER ENGINE (Cont.)

Main Bearings (Crankshaft Removed) – Note each main bearing cap marking and remove main bearing cap. Using Plastigage method, check each bearing tor proper clearance. Replace those bearings found to be excessively worn. To install, coat each bearing lightly with oil and fit to engine block and caps. Install crankshaft and bearing caps with arrows pointing toward front of engine.

Main Bearings (Crankshaft Installed) – **1)** With oil pan and spark plugs removed, remove cap from bearing requiring replacement and remove lower bearing insert. Loosen remaining main bearing caps slightly. Insert upper main bearing removal tool in oil hole in crankshaft journal. If tool is not available, one may be fabricated from a 7/64" cotter pin. See *Fig. 6*.

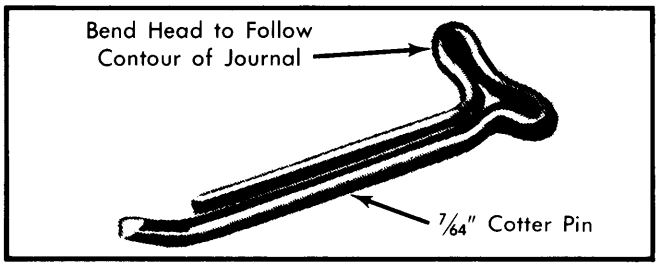

Fig. 6 Fabricated Upper Main Bearing Removal and Installation Tool

2) With cotter pin in place, rotate crankshaft so that upper main bearing insert rotates out in direction of its locking tab and out of block.

3) Because there is no oil hole in No. 4 main journal, use a tongue depressor or similar soft faced tool to push bearing insert out of block.

4) Apply a light film of oil to replacement bearing insert and position in block. Use cotter pin tool to pull upper main bearing into place by rotating crankshaft in opposite direction as for removal. Fit lower bearing to cap and install with arrow pointing forward. Tighten remaining bearing caps.

THRUST BEARING ALIGNMENT

When replacing thrust bearings (located at No. 3 main bearing journal), crankshaft should be moved fore and aft to align thrust faces of bearings.

REAR MAIN BEARING OIL SEAL

Removal – Remove oil pan and rear main bearing cap. Loosen all remaining main bearing bolts. Using a brass drift, tap upper seal until seal is protruding enough to permit pulling it out completely. Remove lower seal from bearing cap.

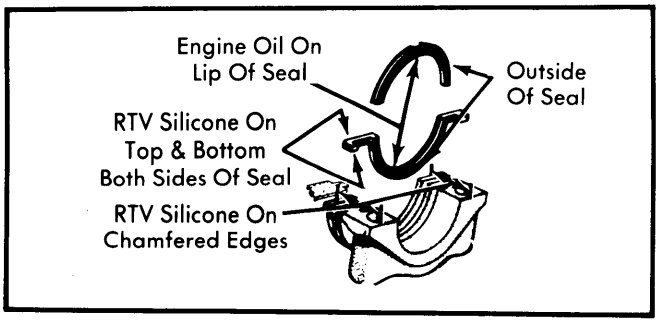

Fig. 7 Exploded View of Rear Main Bearing Oil Seal

Installation – Reverse removal procedure while noting following: Lip of seal must face front of engine. Make sure seal is firmly seated in bearing cap recess. Use suitable sealer and apply as indicated in illustration.

CAMSHAFT

ENGINE FRONT COVER

Removal – **1)** Remove drive belts, fan and hub assembly, and vibration damper. Remove oil pan-to-front cover bolts and cover-to-block bolts. Remove front cover and gasket.

2) Cut off oil pan gasket end tabs flush with front face of engine block and remove tabs. Clean all gasket surfaces.

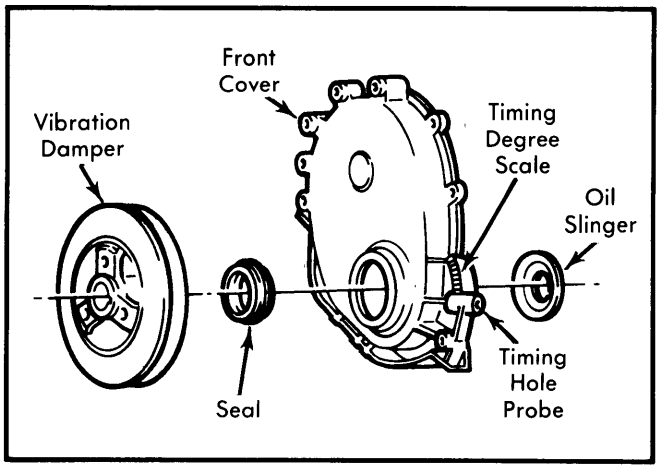

Fig. 8 Exploded View of Engine Front Cover Assembly

Installation – **1)** Apply a suitable sealing compound to both sides of replacement gasket and fit front cover gasket to block. Cut end tabs off replacement oil pan gasket to correspond to pieces cut off of original gasket and cement to oil pan.

2) Position front cover to engine. Place front cover alignment tool in crankshaft opening of front cover and install mounting bolts. Tighten all bolts and remove alignment tool. Reverse removal procedures to complete installation.

FRONT COVER OIL SEAL

Removal & Installation – Remove drive belt(s), accessory drive pulley and vibration damper. Remove oil seal using tool (J-9256). To install new seal, apply light film of suitable sealer on outside diameter of seal and position on cover with seal lip facing outward. Use alignment and seal installation tool (J-22248) with screw from tool (J-9163) to press seal into cover until it bottoms. Apply light film of engine oil on seal lip and install vibration damper, accessory drive and drive belt(s).

TIMING CHAIN

Removal – Remove engine front cover. Remove camshaft sprocket retaining bolt and washer. Rotate crankshaft until timing mark on sprocket is aligned with camshaft sprocket timing mark (see illustration). Remove sprockets and timing chain as an assembly.

Installation – Assemble timing chain, crankshaft sprocket, and camshaft sprocket with timing marks aligned (see illustration). Install assembly to crankshaft and camshaft. Install camshaft sprocket retaining bolt and washer, then tighten.

4.2L 6-CYLINDER ENGINE (Cont.)

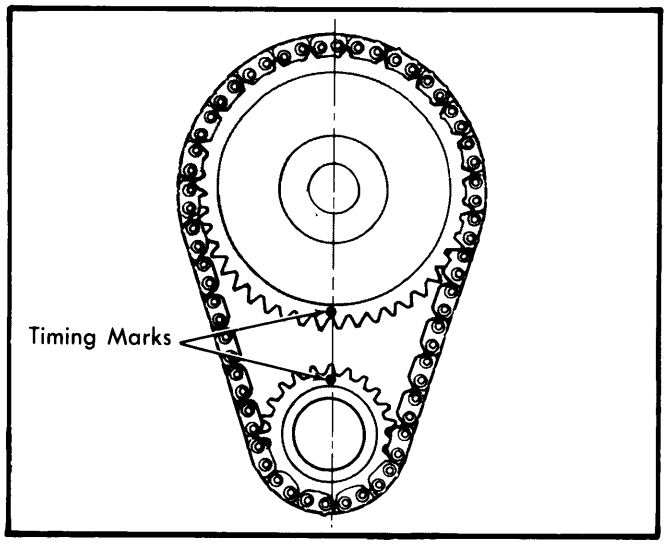

Fig. 9 Timing Chain Sprocket Alignment

CAMSHAFT

Removal – Drain coolant and remove radiator and fan assembly. If equipped, remove air conditioning condensor and receiver assembly as a charged unit. Remove fuel pump, distributor, and ignition wires. Remove rocker arm cover, rocker arms, bridge and pivot assemblies, and push rods. Remove cylinder head and hydraulic lifters. Remove engine front cover and timing chain and sprockets. Remove front bumper and grille as required and carefully remove camshaft.

Installation – Reverse removal procedure while noting following: Lubricate camshaft with suitable oil supplement and install camshaft carefully to avoid damage to camshaft lobes.

CAMSHAFT BEARINGS

NOTE – *When installing cam bearings, use a screw-type cam bearing installation tool, one that provides steady pressure. Do Not use a driver-type cam bearing installation tool.*

CAM LOBE LIFT

Remove rocker arm cover, rocker arms and pivots. Remove spark plugs and proceed as follows:

1) Using suitable clamping or mounting fixture, attach dial indicator to cylinder head so indicator probe rests on top of push rod with indicator and probe in a vertical position over push rod.

CAUTION – *If using an auxiliary starter switch, distributor primary lead must be disconnected from negative post of coil.*

2) Rotate crankshaft slowly until valve lifter is on heel of cam lobe. At this point, push rod will be at its lowest point.

3) With push rod at lowest position, zero dial indicator and rotate engine until push rod is in fully raised position. Compare total lift recorded with specifications. If less than specifications, camshaft is defective. Check all remaining lobes of camshaft in same manner.

VALVE TIMING

Remove spark plugs, rocker arm cover, and rocker arms and bridged pivot from No. 1 cylinder. Rotate crankshaft until No. 6 piston is at TDC on compression stroke. Rotate crankshaft counterclockwise 90°. Install dial indicator with indicator point touching No. 1 cylinder intake push rod, then set dial indicator to zero. Rotate crankshaft clockwise until dial indicator shows .016" lift. Timing mark on vibration damper should index with TDC mark on engine front cover. If timing mark is more than ½" off TDC in either direction, valve timing is incorrect.

ENGINE OILING

Crankcase Capacity – 4 quarts without filter change, 5 quarts with filter change.

Oil Filter – Replace every 7500 miles or 7½ months, whichever comes first. Filter is full-flow type mounted on right side of crankcase.

Normal Oil Pressure – Minimum of 13 psi at 600 RPM; 37-75 psi at 1600 RPM. Engine at normal operating temperature.

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

ENGINE OILING SYSTEM

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

Crankshaft & Camshaft Bearings – Main and camshaft bearings receive oil from main oil gallery. From main bearings oil passes through passage in crankshaft to connecting rod bearings. Oil throw-off from each connecting rod bearing lubricates cylinder walls, piston pins, camshaft lobes and distributor drive gear.

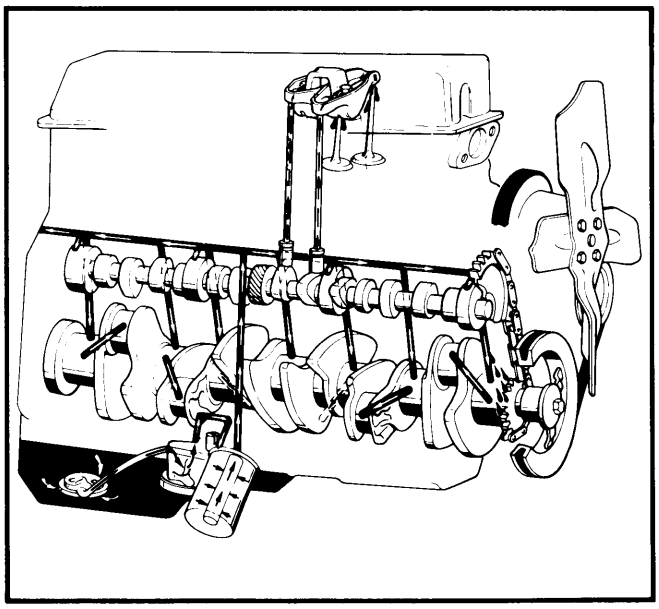

Fig. 10 Engine Oiling System

4.2L 6-CYLINDER ENGINE (Cont.)

Hydraulic Valve Tappets – Lubricated directly from main oil gallery.

Timing Chain & Sprockets – Oil is received from front camshaft bearing and returns to crankcase through cavity under front main bearing cap.

Rocker Arms & Push Rods – Oil from main oil gallery is fed to hydraulic valve lifters. Lifters meter oil to hollow push rods which lubricate rocker arms and pivots. Holes cast in cylinder head return oil to crankcase through lifter area.

OIL PUMP

Oil pump is driven by distributor drive shaft. Removal of pump will not affect ignition timing, as distributor gear remains meshed with camshaft gear. Pump must be filled with petroleum jelly prior to installation of oil pump cover.

CAUTION – *Oil inlet tube position must be changed to allow removal of relief valve; therefore, pickup tube assembly must be replaced upon installation and suitable sealer used.*

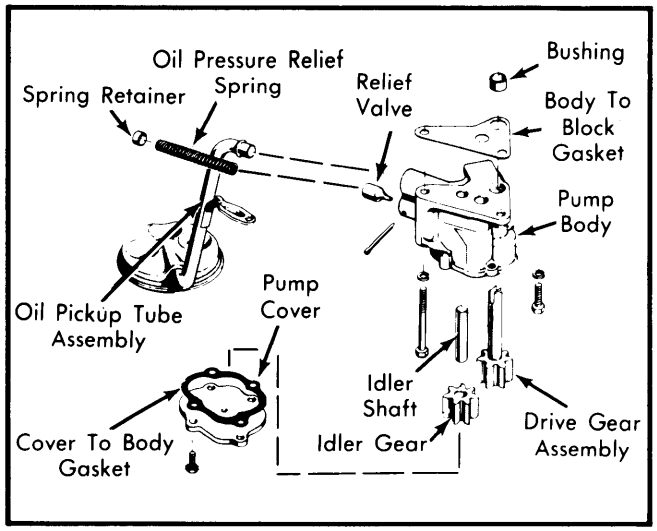

Fig. 11 Exploded View of Oil Pump Assembly

Oil Pump Specifications

Application	Specifications
Gear-to-Body Clearance	.0005-.0025"
Gear End Clearance	①.004-.008"

① – With feeler gauge method. Plastigage method; .002-.006".

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Camshaft Sprocket	45-55
Clutch Housing-to-Block	
Top	22-30
Bottom	37-47
Connecting Rod Nut	30-35
Cylinder Head Bolts	80-90
Drive Plate-to-Converter	20-25
Engine Front Cover	
Screw	4-8
Stud	13-19
Exhaust Manifold Bolt	18-28
Flywheel-to-Crankshaft	95-120
Fuel Pump	13-19
Intake Manifold Bolts	18-28
Main Bearing Cap Bolts	75-85
Oil Pan	
1/4" Bolts	5-9
5/16" Bolts	9-13
Oil Pump Cover	5-7
Oil Pump Screw	
Short	12-20
Long	12-20
Rocker Arm Capscrews	16-26
Thermostat Housing	10-18
Vibration Damper	70-90
Water Pump Screws	9-18

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displ. Cu. Ins.	Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke
1981	258"	2-Bbl.	.....	.....	8.0:1	3.75"	3.895"

VALVES

Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
4.2L							
Int.①	1.782-1.792"	29°	30°	.040-.060"	.3715-.3725"	.001-.003"	.397"
Exh.①	1.401-1.411"	44°	44.5°	.040-.060"	.3715-.3725"	.001-.003"	.397"

① – Do not remove more than .010" from end of valve stem.

4.2L 6-CYLINDER ENGINE (Cont.)

ENGINE SPECIFICATIONS (Cont.)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance	Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
4.2L	.0009-.0017"	.0003-.0005"	Press Fit	1 2 3	.010-.020" .010-.020" .010-.025"	.0017-.0032" .0017-.0032" .001-.008"

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.	Clearance①	Thrust Bearing	Crankshaft End Play	Journal Diam.	Clearance	Side Play
4.2L	2.4986-2.5001"	.0005-.0030"	No. 3	.0015-.0065"	2.0934-2.0955"	.0010-.0025"	.010-.019"

① – For journals No. 2-6; Journal No. 1 – .0005-.0026"; Journal No. 7 – .0011-.0035".

MAIN BEARING FITTING CHART (Journals 1-6)

Main Bearing Journal Color Code & Diameter	Bearing Color & Size Code Upper Insert	Lower Insert
Yellow 2.5001-2.4996"	Yellow Std.	Yellow Std.
Orange 2.4996-2.4991"	Yellow Std.	Black –.001"
Black 2.4991-2.4986"	Black –.001"	Black –.001"
Green 2.4986-2.4981"	Black –.001"	Green –.002"
Red 2.4901-2.4896"	Red –.010"	Red –.010"

MAIN BEARING FITTING CHART (Journal No. 7)

Main Bearing Journal Color Code & Diameter	Bearing Color & Size Code Upper Insert	Lower Insert
Yellow 2.4995-2.4990"	Yellow Std.	Yellow Std.
Orange 2.4990-2.4985"	Yellow Std.	Black –.001"
Black 2.4985-2.4980"	Black –.001"	Black –.001"
Green 2.4980-2.4975"	Black –.001"	Green –.002"
Red 2.4895-2.4890"	Red –.010"	Red –.010"

CONNECTING ROD BEARING FITTING CHART

Connecting Rod Journal Color Code & Diameter	Bearing Color & Size Code Upper Insert	Lower Insert
Yellow 2.0948-2.0955"	Yellow Std.	Yellow Std.
Orange 2.0941-2.0948"	Yellow Std.	Black –.001"
Black 2.0934-2.0941"	Black –.001"	Black –.001"
Red 2.0848-2.0855"	Red –.010"	Red –.010"

VALVE SPRINGS

Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
4.2L Int. Exh.	 1.99" 1.99"	 64-72@1.786" 80-88@1.625"	 188-202@1.411" 210-226@1.188"

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
4.2L	9°	73°	57°	25°

CAMSHAFT

Engine	Journal Diam.	Clearance	Lobe Lift
4.2L No. 1 No. 2 No. 3 No. 4	 2.029-2.030" 2.019-2.020" 2.009-2.010" 1.999-2.000"	.001-.003"	.253"