425" V8 ENGINES

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engines may be identified by the fifth digit of the Vehicle Identification Number located on upper left side of instrument panel and visible from outside the windshield. Engine codes are also stamped behind intake manifold. VIN Codes are as follows:

Application	VIN Code
425" 4-Bbl. V8	S
425" V8 With E.F.I.①	T

① – Electronic Fuel Injection.

SPECIAL ENGINE MARKS

Information identifying oversize and undersize components are stamped in following locations:

Oversize Valve Guides – On cylinder head gasket surface in line with oversize valves. Number indicates amount guide is oversize ("3" indicates .003" oversize).

Oversize Cylinder Bore – On cylinder head face of block. Letter indicates cylinder and piston sizes. See chart. Double letters indicate cylinder has been bored .010" over the diameter indicated by single letter in chart.

Cylinder and Piston Relationship

Letter	Cylinder Size	Piston Size
A	4.0820-4.0824"	4.0810-4.0814"
B	4.0824-4.0828"	4.0814-4.0818"
C	4.0828-4.0832"	4.0818-4.0822"
D	4.0832-4.0836"	4.0822-4.0826"
E	4.0836-4.0840"	4.0826-4.0830"

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

INTAKE MANIFOLD

Removal (Carburetor Models) – 1) Disconnect negative battery cable. Disconnect all hoses at air cleaner and remove air cleaner. Disconnect HEI connector. Disconnect carburetor and cruise control linkage at throttle adapter plate. Disconnect spark plug wires from spark plugs on right side of engine. Disconnect two orange wires from downshift switch and one white wire from choke.

2) Remove throttle return spring and downshift switch bracket. Disconnect power brake vacuum line and vacuum modulator line from rear of carburetor. Position brake line out of way. Disconnect double connector from compressor clutch. Disconnect vacuum hoses at rear of manifold. Disconnect fuel line at carburetor.

3) Disconnect canister purge hose at carburetor and distributor vacuum advance hose at intake manifold. Remove air conditioning compressor without disconnecting hoses, and set aside. Disconnect PCV valve from right valve cover. Disconnect automatic level control vacuum hose (if equipped). Remove manifold bolts and nuts, and remove manifold. Remove sheet metal manifold shield and gasket. Remove front and rear manifold to cylinder block rubber seals.

Installation – 1) Position rubber seals over rails at front and rear of cylinder block. Tabs on gasket should be positioned in holes in rails and beveled ends of gasket tucked into slot at mating of head and rail. Use suitable sealer and position sheet metal gasket and shield on engine.

NOTE – *Holes in gasket should engage dowel pins on cylinder heads.*

2) Install manifold and tighten nuts and bolts. To complete installation, reverse removal procedures.

Removal (Fuel Injection Models) – 1) Disconnect negative battery cable. Remove air cleaner and crankcase filter. Disconnect throttle cable and cruise control linkage at throttle body. Disconnect cable from bracket and position out of way. On left side of engine disconnect all electrical connections. Disconnect harness from fuel rail brackets and position out of way.

2) Disconnect vacuum hoses from carburetor.

CAUTION – *Fuel in fuel system may be under pressure, system must be bled before disconnecting fuel line from fuel rail.*

3) On models without pressure relief valve in rear fuel rail, cover fuel inlet line with a shop towel while loosening clamps. Models equipped with Schrader valve in rear fuel rail do not require bleeding of system. Disconnect fuel line from fuel rail, using a back-up wrench on fuel rail.

4) On right side of engine, disconnect all electrical connections. Disconnect harness from fuel rail brackets and position harness out of way. Remove PCV valve from valve cover. Remove spark plug cables and remove distributor cap. Remove front fuel rail.

5) Remove A/C compressor without disconnecting lines, and position out of way. Remove fuel return line from pressure regulator. Remove intake manifold bolts and nuts and remove intake manifold. Remove sheet metal shield gaskets.

Installation – 1) Position rubber seals over rails at front and rear of cylinder block. Tabs on gasket should be positioned in holes in rails and beveled ends of gasket tucked into slot at mating of head and rail. Use suitable sealer and position sheet metal gasket and shield on engine.

425" V8 ENGINES (Cont.)

NOTE – *Holes in gasket should engage dowel pins on cylinder heads.*

2) Install manifold and tighten nuts and bolts. To complete installation, reverse removal procedure. When connecting fuel line to fuel rail, use back-up wrench on fuel rail while tightening. Do NOT use Teflon tape on flare nut.

CYLINDER HEAD

Removal – 1) Drain cooling system and remove intake and exhaust manifolds. Remove rocker arm covers. Disconnect electrical and ground connections from cylinder heads. Partially remove power steering pump if working on left cylinder head.

2) Remove heater hose from rear of right cylinder head if it is to be removed. Remove alternator and A.I.R. pump. Remove rocker arm assemblies (must later be installed in original positions) and push rods. Remove cylinder head bolts and lift heads from block.

NOTE – *Bottom rear bolt is trapped due to clearance. Suspend the bolt to facilitate removal.*

Installation – Clean all gasket surfaces and position cylinder head and gasket over dowels on block. Install ten head bolts, starting from center of head and working toward both ends, in locations as shown in table and *Fig. 1*.

NOTE – *Bottom rear bolt must be installed and suspended prior to positioning of cylinder head.*

Bolt Location	Length
A (Bolt)	4.36" (Medium)
B (Bolt)	4.77" (Long)
C (Bolt)	3.02" (Short)
D (Bolt/stud)	4.77" (Long)

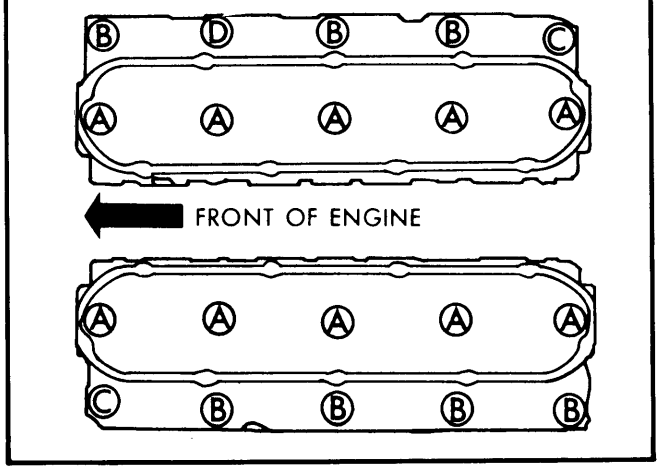


Fig. 1 Cylinder Head Bolt Location

VALVES

VALVE ARRANGEMENT

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

VALVE GUIDE SERVICING

If stem-to-guide clearance exceeds specifications, valve guide should be reamed to next oversize and valve with corresponding oversize stem installed. Service valves are available in standard, .003", .006" and .013" oversize. Use suitable reamer to obtain correct clearance.

NOTE – *If a number "3" is stamped on cylinder head gasket surface, this indicates factory installation of .003" oversize valve guide.*

VALVE STEM SEALS

A nylon oil shedder is used, which is part of valve spring retainer. See *Fig. 2*. Replace any time valve spring is removed.

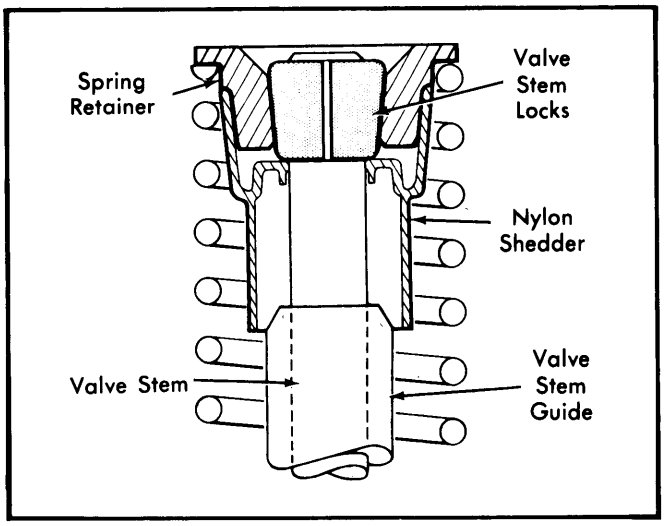


Fig. 2 Valve Spring Retainer & Oil Shedder

ROCKER ARM ASSEMBLY

Replace all parts in original order. See *Fig. 3*.

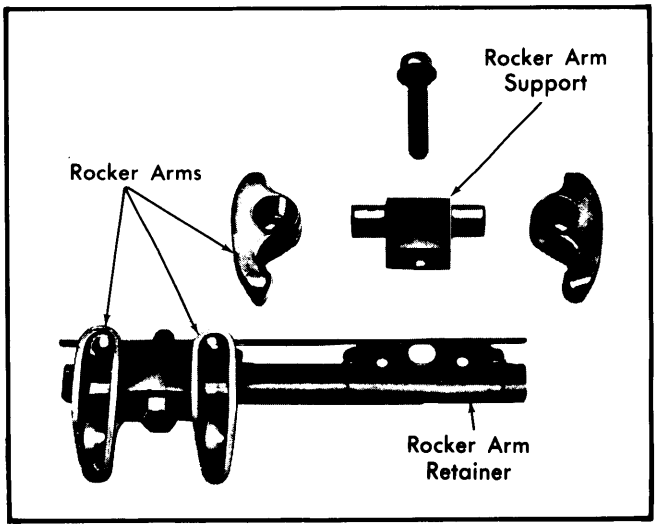


Fig. 3 Rocker Arm Assembly

425" V8 ENGINES (Cont.)

VALVE SPRINGS

Removal – Remove air cleaner, rocker arm cover, rocker arm assembly, push rods and spark plug on cylinder to be serviced. Install suitable adapter (J-22794) to spark plug port and supply air to cylinder. Install rocker arm support bolt and position suitable valve spring compressor (J-22765) over bolt. Compress valve spring, remove locks from valve stem and lift out spring retainer with nylon shedder, then remove spring.

Installation – Install valve spring and new retainer with nylon shedder. Use suitable valve spring compressor to compress spring and install locks.

HYDRAULIC VALVE LIFTER ASSEMBLY

Valve plungers and bodies are matched sets and parts are not interchangeable. Replace any lifter found defective, using lifter removal tool, J-3049.

HYDRAULIC VALVE LIFTER LEAKDOWN RATE CHECK

Use suitable leakdown rate tester J-3074 (or equivalent), to check for faulty lifters without disassembling engine. Tool uses a feeler gauge between rocker arm and valve stem which causes valve spring pressure to force oil out of lifters. When lifter has leaked down enough for valve to seat, a spring on tool which is compressed against valve spring retainer, ejects feeler gauge. Noisy lifter(s) will be those which have shortest leakdown rate. Run engine to allow lifters to fill up with oil and check lifters in order.

NOTE – *Insert feeler gauge of tool quickly to avoid unnecessary leakdown.*

1) Turn off engine. Remove distributor cap and turn crankshaft until rotor points to No. 1 firing position. Remove air cleaner, negative battery cable, spark plug wires, and wiring tabs from rocker arm covers. Remove rocker arm covers and check the following lifters:

No. 1 Intake	No. 1 Exhaust
No. 2 Intake	No. 3 Exhaust
No. 5 Intake	No. 5 Exhaust
No. 7 Intake	No. 6 Exhaust
No. 8 Intake	No. 8 Exhaust

2) Install components previously removed and start engine to allow lifters to fill with oil. Repeat removal of components in step **1)**. With distributor rotor in No. 4 firing position, check the following lifters:

No. 3 Intake	No. 2 Exhaust
No. 4 Intake	No. 4 Exhaust
No. 6 Intake	No. 7 Exhaust

PISTONS, PINS & RINGS

OIL PAN

See Oil Pan Removal at end of ENGINE Section.

PISTON & ROD ASSEMBLY

Removal – **1)** With cylinder heads, oil pan and oil pickup tube assembly removed, use a 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) Mark rods for later identification and remove rod cap. Install rubber hoses over connecting rod bolts to protect crankshaft and bore. Push piston and rod assembly out top of cylinder block and reinstall caps to mating connecting rods.

Installation – **1)** Lightly coat pistons, rings and cylinder walls with engine oil. Make sure compression rings are installed with dimple on ring facing top of piston. Install suitable ring compressor on piston and connecting rod stud guides.

2) Install piston, rod and bearing assembly in cylinder bore with notch on top of piston towards front of engine ("R" on top of piston facing rear of engine). Guide connecting rod onto crankshaft journal, while tapping piston head with wooden hammer handle to seat connecting rod on journal.

3) Remove rubber hoses from connecting rod bolts and install mating rod cap. Be sure numbered side of cap is on same side as numbered side of rod.

NOTE – *Numbered sides of connecting rods on Nos. 1, 3, 5 and 7 must be on right side of engine and Nos 2, 4, 6 and 8 on left side of engine.*

4) Install rod cap nuts and tighten.

FITTING PISTONS

Measure pistons 3/16" below upper cross slot or 1/4" below oil ring groove and perpendicular to piston pin bore. Measure cylinders 1 1/8" from top of bore and perpendicular to crankshaft.

PISTON PINS

Removal – Position support fork of piston pin removing and installing tool, J-24086-11, between piston and connecting rod. Install removal arbor, J-24086-8, through alignment hole in base of tool. Press piston pin out of connecting rod.

NOTE – *Keep piston pins in order or marked to ensure that they are installed in original pistons and connecting rods.*

Installation – **1)** Install pin guide, J-24086-4, through piston and into connecting rod. Tap pin guide into position. See *Fig. 4.*

NOTE – *Pin guide centers connecting rod in piston. Damage can occur if wrong size pin guide is used.*

425" V8 ENGINES (Cont.)

2) Install piston assembly into fork assembly of tool, providing proper support for connecting rod while pressing pin into position. Adjust installing arbor tool, J-24086-9 to "G8" by turning numbered sleeve on lettered shaft. Lock in position with knurled nut.

3) Insert the adjusted arbor tool into top of tool arch, J-24086-10. Pin guide will fall out when piston pin reaches proper location.

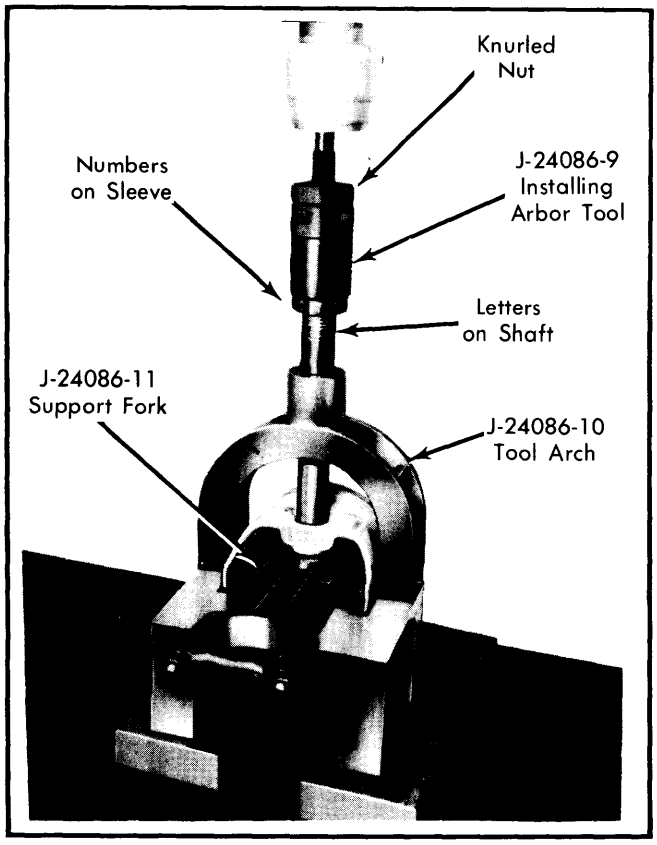


Fig. 4 Piston Pin Installation

CRANKSHAFT & ROD BEARINGS

MAIN & CONNECTING ROD BEARINGS

NOTE – *Following procedures are performed with oil pan and oil pickup tube assembly removed.*

Connecting Rod Bearings – After ensuring rod caps are marked for cylinder identification, remove rod caps. Use Plastigage method for checking proper bearing clearances. If clearance is not within specifications, replace bearings. If new bearings (standard bearings only size available) do not bring clearances within specifications, crankshaft must be replaced.

NOTE – *When installing bearings, tangs on bearings must match notches in rod and cap.*

Main Bearings – **1)** Check main bearing clearances one at a time using Plastigage method. If bearings are being checked with engine in vehicle, crankshaft must be supported to take up clearance between upper bearing half and crankshaft (place strip of .005" brass shim stock between lower bearing half and crankshaft bearing journal in bearing caps adjacent to bearing being checked). If clearance is not within specifications, replace bearings. If new bearings (standard bearings only size available) do not bring clearances within specifications, crankshaft must be replaced.

2) No. 1 upper and lower bearings are interchangeable and No. 2 and 4 upper bearings are interchangeable. No. 2 and 4 lower bearings are interchangeable. No. 3 and 5 bearings are not interchangeable and must be reinstalled in original positions.

3) To replace main bearing upper halves, insert suitable tool, J-8080, in oil hole of crankshaft journal. Rotate crankshaft clockwise to roll bearing from engine. Oil new upper bearing and with locating tang in proper position, rotate crankshaft counterclockwise to position bearing (using tool).

NOTE – *Main bearing caps must be installed in same locations from which they were removed and must face original direction. Cast numbers on cap should match block locations (numbered from front of engine toward rear).*

THRUST BEARING ALIGNMENT

With all main bearing cap bolts finger tight, tap crankshaft forward, then rearward several times to align (No. 3) thrust bearings. Tighten all main bearing cap bolts.

REAR MAIN BEARING OIL SEAL

Removal – Remove engine oil pan. Remove rear main bearing cap and discard lower seal half removed from bearing cap. Rotate upper seal half by pushing on one end with sharp object and remove seal half from cylinder block. Inspect grooves in bearing cap and cylinder block to ensure they are clean, dry and free from burrs.

NOTE – *Two seal halves are identical and pre-lubricated with a film of wax for break-in. Do not remove or damage this film.*

Installation – **1)** To install lower half of seal in bearing cap, slide end of seal into position at one end of cap and place suitable tool made from shim stock in groove at other end of bearing cap. See *Fig. 5*.

2) Lip of seal must face front of engine. Install seal half using tool as a "shoehorn" ensuring seal is flush on each side.

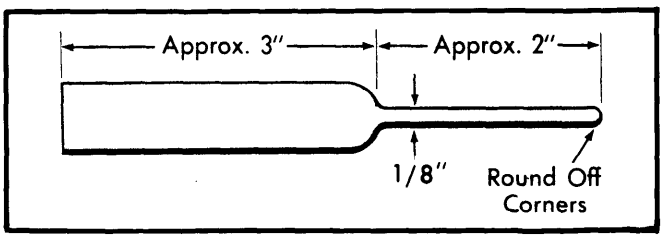


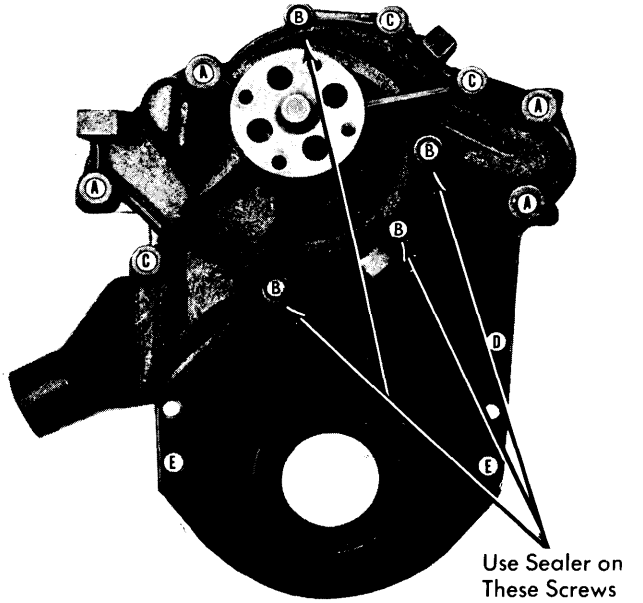
Fig. 5 Oil Seal Installing Tool

425" V8 ENGINES (Cont.)

CAMSHAFT

ENGINE FRONT COVER

Removal – Remove crankshaft pulley and spacer. Loosen starter enough to gain access to oil pan bolts. Loosen oil pan bolts and lower front of oil pan. Remove lower radiator hose from water pump. Remove bolts securing front cover and lift off front cover and water pump as an assembly. Discard the gasket.



Key	(No.)	Size	Torque
A	(4)	3/8-16 x 1-3/8	22 Ft. Lbs.
B	(4)	1/4-20 x 1-1/8	6 Ft. Lbs.
C	(3)	5/16-18 x 1-1/4	10 Ft. Lbs.
D	(1)	5/16-18 x 5/8	10 Ft. Lbs.
E	(2)	3/8-16 x 5/8	22 Ft. Lbs.

Fig. 6 Engine Front Cover Bolt Locations & Torque Specifications

Installation – Clean all gasket surfaces and install new front cover gasket over locating dowels on cylinder block, using a small amount of sealer to hold gasket in place. Install front cover and water pump assembly over end of crankshaft, lining up dowel holes in cover with dowels on cylinder block. Install bolts and tighten. See *Fig. 6* for location of bolts and tightening specifications.

NOTE – *Be sure oil pan seal has not been damaged during front cover removal. Use gasket cement on seal areas.*

FRONT COVER OIL SEAL

Removal & Installation – Remove crankshaft pulley and hub. Using a thin-bladed screwdriver, pry out front cover oil seal and discard. Lubricate new oil seal, filling cavity with wheel bearing grease. Position seal on end of crankshaft with spring side toward engine. Using suitable tool, J-22770, drive seal into front cover until it bottoms.

CAMSHAFT

Removal – Remove radiator, front cover, distributor, oil pump and fuel pump. Remove oil slinger from crankshaft. Remove bolt securing fuel pump eccentric to camshaft and remove eccentric. Remove bolts securing camshaft sprocket to camshaft and remove camshaft sprocket with chain attached. Remove valve lifters and slide camshaft forward carefully (until free) to prevent damage to bearing bores.

Installation – Apply a thin coat of rear axle lubricant to all camshaft lobes and bearing journals, and guide camshaft carefully into cylinder block. Reverse removal procedures while noting the following: Extreme care must be exercised to avoid nicking or scratching camshaft bearings. Install camshaft sprocket in timing chain with timing mark toward front. Place chain over crankshaft sprocket and line up timing marks on both sprockets. See *Fig. 7*. Index hole in camshaft must line up with index hole in sprocket.

NOTE – *Engine is now timed in No. 4 Cylinder firing position. Adjust distributor rotor to No. 4 position or turn crankshaft 360° and set ignition timing on cylinder No. 1.*

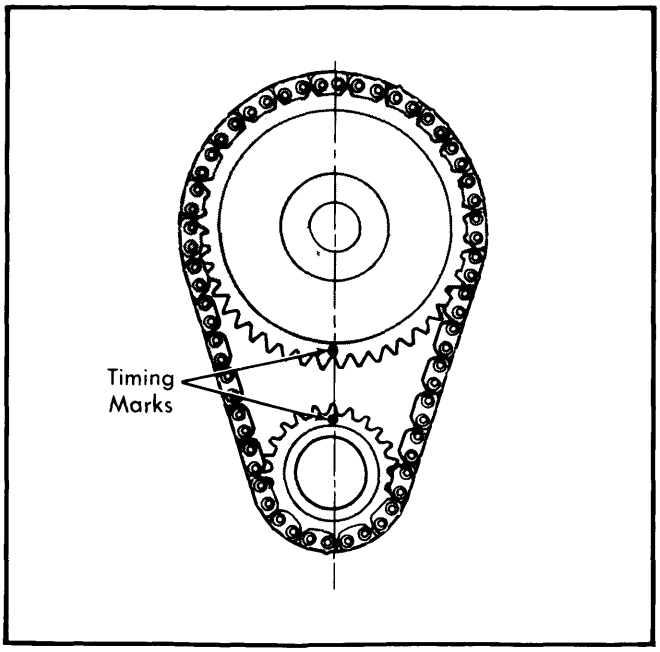


Fig. 7 Timing Chain Sprocket Alignment

CAMSHAFT BEARINGS

Removal – Remove camshaft and use suitable tool, J-21054-2 to remove bearings. Using suitable driver, J-25262-7, drive No. 1 bearing through rear face of bearing bore and remove from tool. Position pilot, J-25262-6, in No. 1 camshaft bearing journal. Remove remaining bearings in same manner.

NOTE – ***When removing No.5 bearing, drive out rear plug along with bearing.***

425" V8 ENGINES (Cont.)

Installation – Install new plug in rear of No. 5 bearing bore and seal plug with suitable sealer. Scribe a reference mark on front face of each bore to indicate position of center oil passage. Using suitable tools, install bearings. Line up oil hole in bearing with scribe mark on front face of bore. Install No. 5 bearing first and work in reverse order toward No. 1 bearing.

ENGINE OILING

Crankcase Capacity – 4 quarts. Add 1 quart with filter change.

Oil Filter – Change at first oil change and every second oil change after that.

Normal Oil Pressure – 35-40 psi at 30 MPH. Average pressure at idle is 10 psi.

Pressure Regulator Valve – Not adjustable.

ENGINE OILING SYSTEM

Right longitudinal header is fed through angular passage from oil filter and pump. See *Fig. 8*. Oil crosses to left longitudinal header through intersecting vertical passages above No. 2 camshaft bearing, continuing through left longitudinal header to oil pressure signal switch.

Crankshaft, Camshaft & Connecting Rods – Main bearings No. 2, 3 and 4 are lubricated from right longitudinal header through holes drilled in block. Main bearings No. 1 and 5 are lubricated in same manner from left header. Camshaft bearings are lubricated from corresponding main bearings through holes in block. Connecting rod bearings are lubricated from adjacent main bearing through holes in crankshaft.

Lifters, Rocker Arms, Pistons & Pins – Longitudinal headers feed hydraulic valve lifters under pressure through drilled passages. From lifters, oil flows through hollow push rods to rocker arms, controlled by metering disc in lifter. Oil comes through feed hole in rocker arm, flows onto arm, lubricating rocker arm pivot points, push rod tips, and valve tips. Pistons, pins and cylinder walls are lubricated by oil splashed up from crankcase. Oil drains from cylinder heads into valve lifter compartment, returns to crankcase through hole on bottom of compartment.

OIL PUMP

Oil pump is mounted on right side near front of engine. Remove oil filter. Remove 5 bolts securing pump to engine, leaving bolt nearest pressure regulator until last. Clean and inspect all parts. See *Oil Pump Specifications*. Before reinstalling pump, pack it with petroleum jelly.

Oil Pump Specifications

Gear Backlash	.001-.013"
Gear-to-Body Clearance	① .001-.004"
Reg. Valve-to-Bore Clearance	①.0020-.0035"
Reg. Valve Spring	
Free Length	2.57-2.69"
Pressure@1.460"	9.3-10.5 lbs.

① – Wear limit .005".

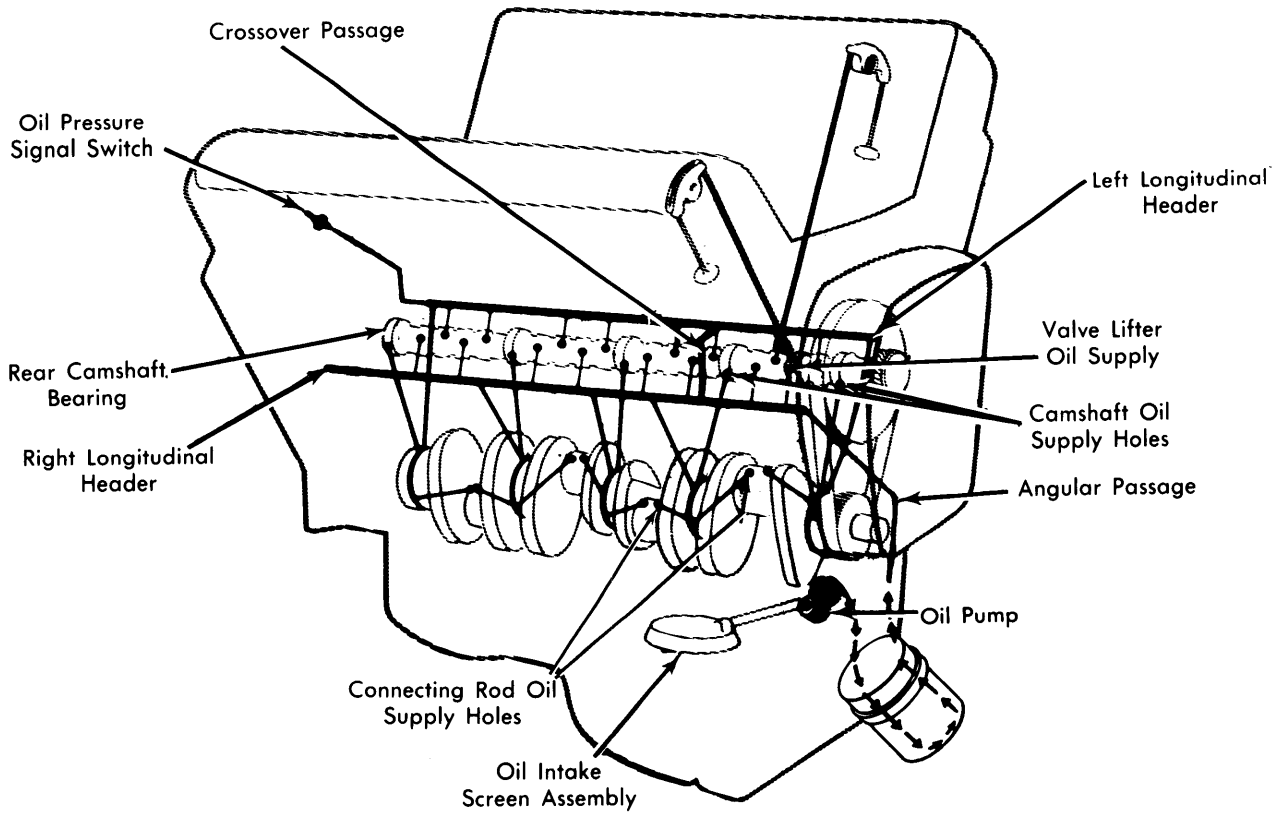


Fig. 8 Engine Oiling System

425" V8 ENGINES (Cont.)

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Engine	Net HP At RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke	Displ. Cu. Ins.
425" (Carb. Models)	180 @4000	320 @2000	8.2:1	4.082"	4.060"	425
425" (EFI Models)	195 @3800	320 @2400	8.2:1	4.082"	4.060"	425

VALVES

Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
425" Int.	2.000"	44°	45°	1/16"	.3413-.3420"	.0010-.0027"	.457"
Exh.	1.625"	44°	45°	1/16"	.3411-.3418"	.0012-.0029"	.473"

PISTONS, PINS, RINGS

	PISTONS	PINS			RINGS	
Engine	① Clearance	Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
425"	.0006-.0014"	.0002-.0004"	Press Fit	Comp Oil	.013-.023" .015-.055"	.0017-.0040" None

① — Measured at top of skirt.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	Clearance	Thrust Bearing	Crankshaft End Play	Journal Diam.	Clearance	① Side Play
425"	3.250"	②.0001-.0026"	No. 3	③.002-.012"	2.500"	④.0005-.0028"	.008-.020"

① — Total, 2 rods. ② — Wear limit .0045" ③ — Wear limit .015" ④ — Wear limit .0035"

CAMSHAFT

Engine	Journal Diam.	Clearance	Lobe Lift
425"	.....	.001-.0022"	Int. .266" Exh. .275"

VALVE SPRINGS

Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
425"			
Int.	2.250"	60-65@1.946"	155-165@1.496"
Exh.	2.250"	60-65@1.946"	155-165@1.496"

VALVE TIMING

	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ALDC)	Open (BLDC)	Close (ATDC)
425"	21°	111°	73°	55°

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Camshaft Sprocket	18
Connecting Rod	40
Cylinder Head (Special — Oiled)	95
Distributor Clamp	15
Exhaust Manifold	②35
Flywheel-to-Converter	30
Flywheel-to-Crankshaft	75
Front Cover	①
Fuel Pump	12
Intake Manifold	30
Main Bearing	90
Oil Pan	10
Oil Pump	15
Rocker Arm Support Bolt	70
Thermostat Housing	10
Transmission Housing-to-Block	35
Water Pump	①

① — See Fig. 6.
② — Torque short screw to 12 Ft. Lbs.