VEGA 2300 CC

GENERAL SPECIFICATIONS						
Engine	Net HP At RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke	Displ. Cu. Ins.
140" 1-Bbl.	75 @ 4400	115 @ 2400	8.0-1	3.500"	3.625"	140"
140" 2-Bbl.	85 @ 4400	122 @ 2400	8.0-1	3.500"	3.625"	140"

NOTE – Horsepower and Torque figures given above are NET. Net Horsepower and Torque represents power at the flywheel when the engine is installed in a 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 Code is stamped opposite number three cylinder on right side of cylinder block.

Code	HP	Trans. (Carb.)
CAA, CAJ	75	Man. Trans. (1-Bbl.)
CAB, CAH	75	Auto. Trans. (1-Bbl.)
CAD, CAL	85	Man. Trans. (2-Bbl.)
CAC, CAK	85	Auto. Trans. (2-Bbl.)

ENGINE REMOVAL

Disconnect battery cables, all water, vacuum and emission control hoses. Disconnect all wires at sending units, switches and solenoids, then proceed as follows:

1) Remove radiator panel or shroud, radiator, fan and spacer. Position power steering pump and A/C compressor out of way.

2) Raise vehicle and disconnect exhaust pipe at manifold. Remove flywheel dust cover or converter underpan. With Auto. Trans., remove converter retaining bolts and nuts and install converter safety strap.

3) Remove converter housing or flywheel housing bolts. Loosen engine front mount bolts at frame attachment. Lower car to ground and install floor jack or suitable support under transmission.

4) Using suitable lifting tackle, slightly raise engine to take weight from engine mounts and remove engine front mount retaining bolts. Pull engine forward to clear transmission while slowly lifting engine. Remove engine from vehicle.

INTAKE MANIFOLD

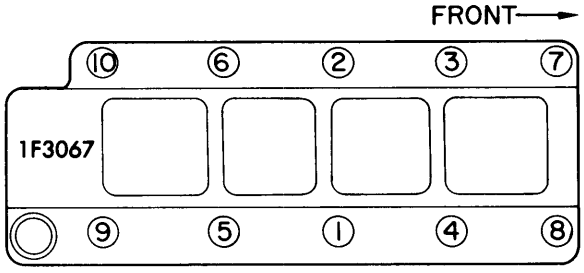
Removal – Remove exhaust gas recirculation tube. Disconnect battery, heater hose, vent tube at base of air cleaner and remove air cleaner. Remove air cleaner silencer. Disconnect choke rod, positive crankcase ventilation valve, fuel line, bowl vent line, throttle linkage, transmission throttle valve linkage and power steering pump. Disconnect Delcotron unit and remove intake manifold retaining bolts. Remove manifold.

Installation – To install, reverse removal procedure using new manifold gasket.

CYLINDER HEAD

Removal – Drain cooling system and disconnect heater hose from water outlet. Remove engine front cover, camshaft cover, timing belt and camshaft timing sprocket. Remove intake and exhaust manifolds. Remove head bolts and remove head.

Installation – Install head gasket with smooth side up. Coat head bolt threads with anti-seize compound. *NOTE – Head bolts are two different lengths; 6 3/8" on manifold side and 5 5/8" on spark plug side.* Tighten head bolts a little at a time, in sequence (see illustration), until proper torque is attained.



CYLINDER HEAD TIGHTENING SEQUENCE

VALVES								
Engine & Valve		Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
140"	Int.	1.620"	45°	46°	3/64-1/16"	.3414"	.0010-.0027"	① .4199"
	Exh.	1.375"	45°	46°	3/64-5/64"	.3414"	.0010-.0027"	② .4302"

① – 85 HP – .4367".
② – 85 HP – .4379".

VEGA 2300 CC (Cont.)

VALVE ARRANGEMENT

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

VALVE GUIDES

Guides are integral with cylinder head. If valve stem clearance in guide is excessive, valves with oversize stems are available in .003", .015" and .030" oversize for replacement. Ream guide bores to accomodate oversize stems and afford specified clearance.

VALVE SPRINGS

Engine	Free Length	PRESSURE (LBS.) Valve Closed	Valve Open
140"	.....	71-79 @ 1.746"	183-197 @ 1.310"

VALVE SPRINGS

Removal – Remove valve tappet and adjusting screw. Remove spark plug on cylinder to be serviced and install air line adapter to plug hole. Rotate crankshaft 90° from TDC position before applying air pressure to eliminate possibility of interference between valve and piston with valve compressed. Use suitable spring compressor (J-23592) and compress valve spring to remove valve locks. Remove tool, valve cap, valve spring and damper assembly and valve stem oil seal.

Installation – Before reinstalling old springs, check with a suitable spring tester. Springs should be replaced if not within 10 lbs. of specified load (without dampers). Install new oil seal over valve guide, valve spring and damper assembly over valve stem, then install valve cap. Compress valve spring and install valve locks.

VALVE SPRING INSTALLED HEIGHT

Specified height is 1¾" (±1/32") measured from spring seat to top of spring. If measured height exceeds specifications, install spring seat shim approximately 1/16" thick. Do not shim to give an installed height under specifications.

MECHANICAL VALVE LIFTER ADJUSTMENT

NOTE – Adjusting screw in tappet is threaded in all areas except the flat of screw that contacts valve stem (see illustration). Adjusting screw must always be turned a complete revolution to maintain correct position of flat in relation to valve stem.

Adjust valve lash clearance (between tappet and cam lobe) with tappet on base circle of camshaft lobe as follows:

1) With front cover installed, mark distributor housing at number one and four plug wires and remove distributor cap. Crank engine until rotor points toward number one and points are open. Alternate method is with front cover removed, rotate camshaft timing sprocket to align timing mark on sprocket with inverted "V" notch on timing belt upper cover. For both methods, adjust following valves:

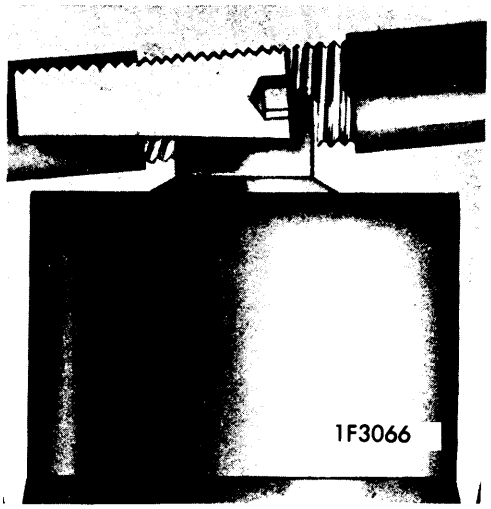
No. 1 Cylinder..... Intake & Exhaust
No. 2 Cylinder..... Intake
No. 3 Cylinder..... Exhaust

2) Crank engine until rotor points to number four and breaker points are open or rotate camshaft sprocket 180° so timing mark is at 12 o'clock position and in line with notch on upper belt cover. Adjust following valves:

No. 2 Cylinder..... Exhuast
No. 3 Cylinder..... Intake
No. 4 Cylinder..... Intake & Exhaust

Adjustment Specifications

Engine	Intake	Exhaust
2300 cc	.014-.017"	.029-.032"



VALVE TAPPET & ADJUSTING SCREW

PISTONS, PINS, RINGS

Engine	PISTONS ①Clearance	PINS ② Piston Fit	③ Rod Fit	RINGS Rings	End Gap	Side Clearance
140"	.0018-.0028"	.0003-.0004"	.0008-.0021"	1 2 3	.015-.025" .009-.019" .010-.030"	.0012-.0027" .0012-.0027" .0000-.0050"

① – Wear limit .005"
② – Wear limit .001"
③ – Interference Fit.

VEGA 2300 CC (Cont.)

OIL PAN & BAFFLE

Removal – 1) Raise vehicle on hoist and drain crankcase. Support front of engine so weight is off engine front mounts. Remove frame crossmember and both front crossmember braces. Disconnect steering idler arm at frame side rail. *NOTE – With A/C, disconnect idler arm at relay rod.*

2) Mark relationship of steering linkage pitman arm to steering gear pitman shaft, and remove pitman arm. *NOTE – Do not rotate steering gear pitman shaft while steering arm is disconnected as this will change wheel alignment.*

3) Remove flywheel cover or convertor underpan. Remove oil pan screws and remove oil pan. Remove pick-up screen screw. Remove pick-up screen to baffle support bolts and remove support from baffle. Remove bolt securing oil drainback to baffle and remove baffle from pick-up screen.

4) Remove pick-up screen to baffle support bolts and remove support from baffle. Remove bolt securing oil drainback to baffle and remove baffle from pick-up screen.

Installation – 1) Clean all gasket surfaces and apply suitable sealing compound to gasket mating surface of oil pump assembly. Position baffle gasket to baffle and position baffle to engine, installing two pan screws to temporarily retain baffle to engine. Install oil drain back tube-to-baffle retaining screws. Install pick-up tube support and screws. Install screen to support.

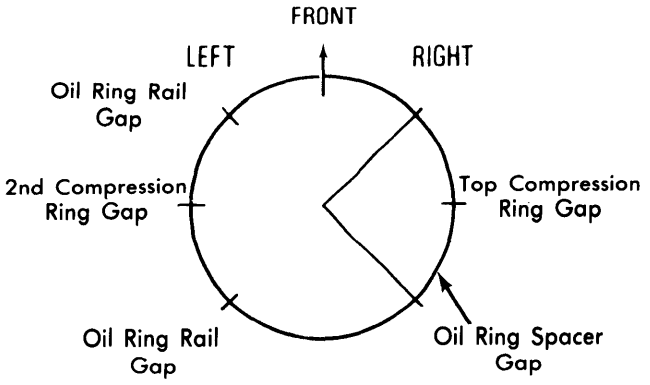
2) Position gasket on oil pan, remove temporary bolts holding baffle, and install oil pan and bolts. Tighten bolts alternately and evenly to provide a uniform draw on pan and gasket. *NOTE – Coat oil pan bolt threads with anti-seize compound before installing.*

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.

Removal – With cylinder head, oil pan and baffle removed, use a suitable 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.* Inspect connecting rods and caps for cylinder identification and mark as necessary. Remove rod cap and install suitable tool (J-23627) on connecting rod studs. Push piston and rod assembly out top of cylinder block.

Installation – Lightly coat cylinder bores, pistons and rings with engine oil. Ensure that ring gaps are properly spaced (see illustration) and marked side of compression ring is toward top of piston. Install ring compressor on piston. Install suitable tool (J-23627) on connecting rod studs. Install each piston and rod assembly (with "F" on piston facing front of engine) in its respective bore and guide connecting rod onto crankshaft journal while tapping piston head with hammer handle to seat connecting rod against crankshaft. Remove tool from studs and install rod caps. Tighten nuts.



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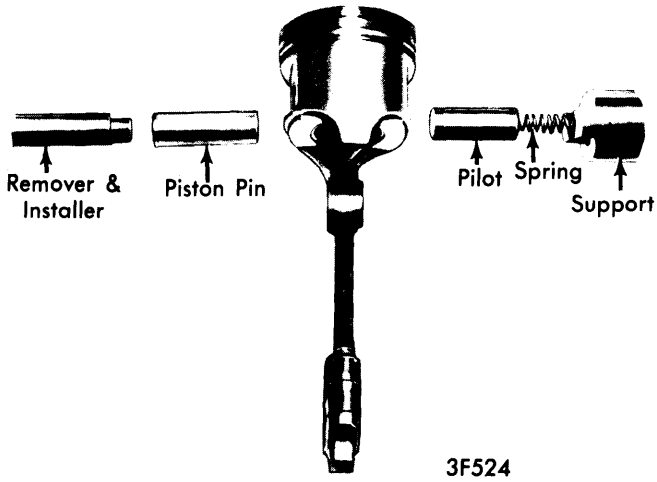
RING GAP LOCATION

FITTING PISTONS

Production pistons are available in four sizes, increasing in diameter by .0005" for each part number. Oversize pistons are also available in .010" and .020" oversize. Measure cylinder bore 2½" from top of bore. Measure piston diameter at skirt across center line of piston pin. If clearance is in excess of specifications, a new piston may be required along with honing of cylinder bore.

PISTON PINS

Pins are press fit in piston. Piston and pin are a matched set and are not serviced separately. Measure pin and piston pin bore. If clearance is in excess of .001" wear limit, replace piston and pin assembly. Remove pin using arbor press and suitable adaptors (see illustration).



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PISTON PIN INSTALLATION

VEGA 2300 CC (Cont.)

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	Sideplay
140"	2.2988"	① .0035"	No. 4	.002-.007	1.999-2.000"	.0007-.0038"	.0085-.0135"

① — No. 1 Bearing .002".

MAIN & CONNECTING ROD BEARINGS

NOTE — Following procedures are with oil pan and baffle removed.

Connecting Rod Bearings — After ensuring rod caps are marked for cylinder identification, remove rod caps. Use Plasitgage method to check for proper bearing clearances. If not within specifications, new bearings must be installed. New bearings are available in .001", .002", .010" and .020" undersize. Selective fitting is required on each connecting rod. A standard bearing half may be used in combination with a .001" undersize or a .001" undersize in combination with a .002" undersize. Coat bearing surfaces with oil, install rod cap and tighten nuts.

Main Bearings — Starting with rear main bearing cap and working forward, remove one main bearing cap at a time and check bearing clearances using Plastigage method. If clearances are not within specifications, bearing halves must be replaced. A standard bearing half may be used in combination with a .001" undersize or a .001" undersize in combination with a .002" undersize. Use suitable tool in oil hole of crankshaft journal to remove upper half of main bearings. Rotate engine clockwise forcing upper main bearing half out. Oil new upper bearing half and insert plain (unnotched) end between crankshaft and indented (notched) side of block. Rotate bearing into place. Install main bearing cap (with "F" pointing toward front of engine) with bearing on engine and tighten bolts. After all bearings have been checked, rotate crankshaft to see there is no excessive drag.

THRUST BEARING ALIGNMENT

Tighten all main bearing cap bolts a small amount and force crankshaft rearward to seat and align bearing caps. Then thrust crankshaft forward to align rear faces of thrust bearing. Tighten all main bearing cap bolts to specifications.

REAR MAIN BEARING OIL SEAL

Removal — With oil pan and baffle removed, remove rear main bearing cap and discard lower seal. Loosen remaining bearing caps to allow crankshaft to be lowered slightly. Use suitable punch to push upper seal out of bearing sufficiently to permit it to be fully removed with pliers. Rotating crankshaft while pulling on seal will aid in removal.

Installation — Install new seal in bearing cap using suitable forming tool and cut ends of seal off flush with surface of bearing cap. Install new upper seal by inserting a piece of soft wire in end of seal and wrapping wire a few turns around end of seal (use "Chinese Finger" type installer if available). Use wire to pull seal into place in block (rotate crankshaft if necessary). Tighten all other bearing caps. Install rear main bearing cap and side sealant (comes with new gaskets along with instructions). Tighten bolts on rear main bearing cap.

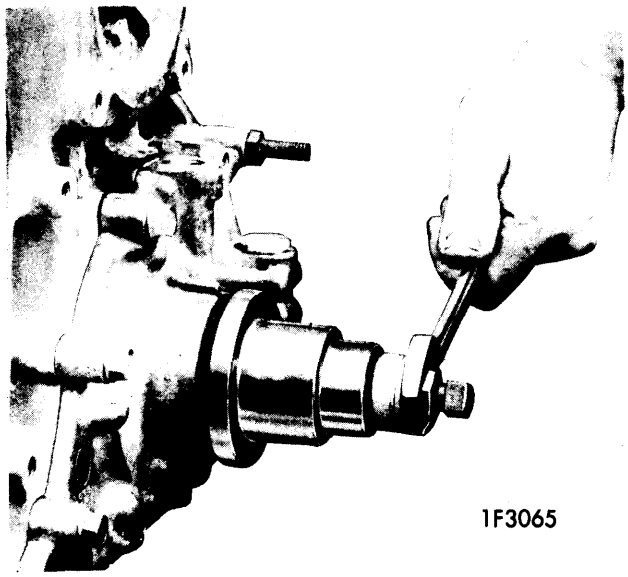
ENGINE FRONT COVER

Disconnect negative battery cable and remove fan and spacer. Loosen lower cover screws (cover is slotted) and remove upper screw and nut. Remove front cover.

OIL PUMP (FRONT CRANKCASE) SEAL REPLACEMENT

Removal — Remove engine front cover, accessory drive pulley, timing belt, lower cover, and crankshaft timing sprocket. Pry old seal from front cover.

Installation — Coat new seal lips with oil and apply sealing compound to outside diameter. Position seal, closed end outward, onto crankshaft and install in bore of cover with suitable tool (J-23624).



INSTALLING CRANKSHAFT FRONT SEAL

CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift ②
140"	2.2817"	.....	Int. .4199" Exh. .4302"

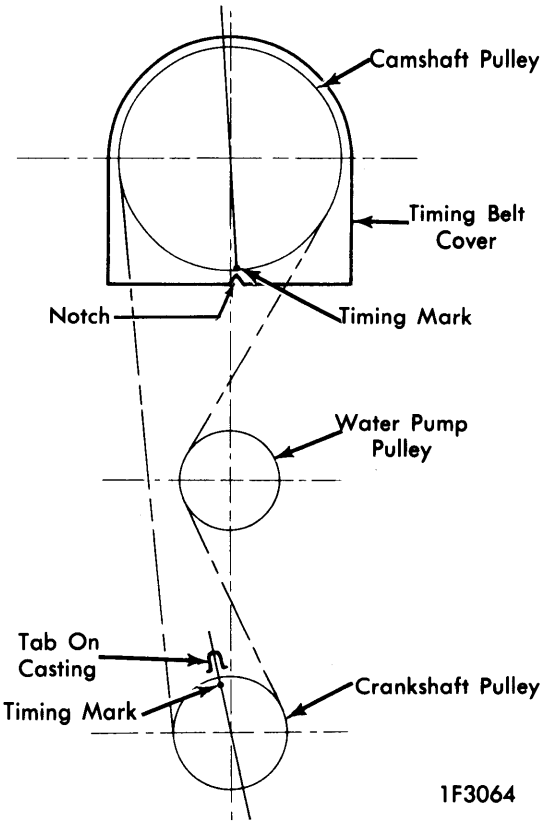
① — End Play .004-.012".
② — 85 HP — Int. .4369".
Exh. .4379".

VEGA 2300 CC (Cont.)

TIMING BELT REPLACEMENT

Removal – Remove engine front cover and accessory drive pulley. Drain cooling system and loosen water pump bolts. Remove lower belt cover and remove belt. Remove water pump, install new gasket and loosely install water pump.

Installation – Align timing mark on cam sprocket with notch on timing belt upper cover. Align crankshaft sprocket timing mark with cast rib on oil pump cover. Install timing belt on crankshaft sprocket (back of belt in water pump track), then install belt to camshaft sprocket making sure both sprockets maintain their indexed positions. Install lower belt cover and adjust belt tension.



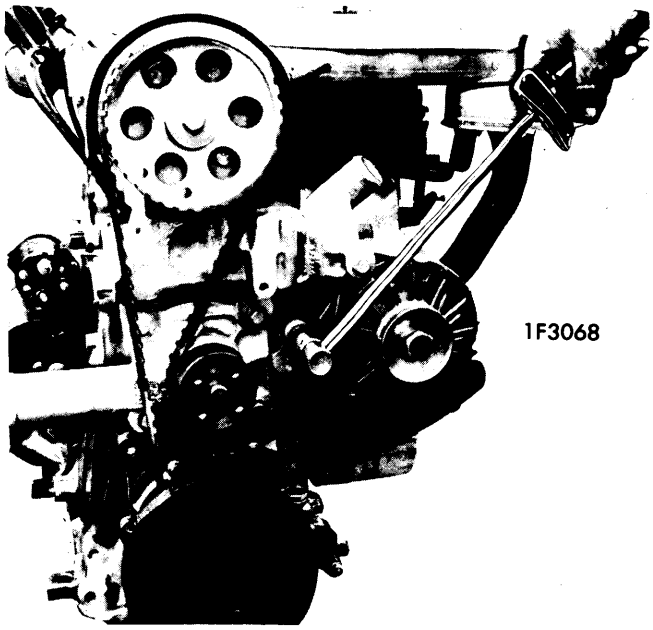
SPROCKET TIMING MARKS

Belt Tension Adjustment – Position suitable tool (J-23564) in gauge hole adjacent to left side of water pump. Apply 15 ft. lbs. torque to water pump (see illustration) and while maintaining this torque, tighten water pump bolts.

Belt Tension Check With Strand Tension Gauge – Position strand tension gauge onto belt so bail wire is between cogs and foot of gauge is on grooved side of belt. Depress handle of gauge until it bottoms and observe gauge reading. Correct tension for timing belt is 100-140 lbs.

CAMSHAFT

Removal – 1) Remove hood, carburetor fuel line, choke coil, (with cover and rod assembly). Remove camshaft cover and distributor. Remove timing belt (leave accessory drive pulley in place). Remove camshaft timing sprocket by aligning one hole



TIMING BELT ADJUSTMENT

in sprocket with bolt head behind sprocket, then install socket on bolt head to prevent cam from turning. Remove camshaft sprocket retaining bolt and remove sprocket. Remove timing belt upper cover, cam retainer and seal assembly.

2) Raise vehicle and disconnect engine front mounts at body attachment. Raise front of engine and install wood blocks approximately 1½" thick between engine mounts and body. Lower vehicle.

3) Install suitable camshaft removal tool (J-23591) to cylinder head and depress tappets. *NOTE – Use a torque wrench on depressing screws. Approximately 10 ft. lbs. of torque will be necessary to fully depress tappets. If more than 10 ft. lbs. is required, check tool for proper installation.* Slide camshaft forward until it clears cylinder head.

Installation – Position camshaft in cylinder head until journals are seated in their respective bore. Reverse removal procedure for remaining parts.

CAMSHAFT BEARINGS

Removal – Install remover-installer plate of suitable tool (J-23638) into front bearing and tap bearing from bore. To remove remaining bearings, install guide plate into front bore of head and tap bearing from bore. *NOTE – Tap rear bearing slowly into distributor shaft housing being careful not to unseat end plug. Crush bearing to remove from housing.*

Installation – Install new bearings beginning with rear bearing and working forward while noting the following: Oil holes in three rear bearings must be aligned with oil holes in case. Oil holes in first two bearings should be placed in 11 o'clock position and oil groove in number one bearing toward front of engine.

VEGA 2300 CC (Cont.)

CAMSHAFT END THRUST

Attach a dial indicator to cylinder head so indicator plunger can follow cam movement. Move camshaft back and forth and record movement. If end thrust is not within specifications, replace camshaft retainer. Retainers are available in increments of .004" beginning with .226" and ranging up to .238".

CAM LOBE LIFT

Attach dial indicator to cylinder head so intake and exhaust valve of same cylinder can be measured. Rotate crankshaft until dial indicator is on heel of cam lobe. Set dial at zero and bump engine over until indicator shows a fully raised position. If lift is not within specifications, replace camshaft. *NOTE – Distributor primary lead must be disconnected from negative post on coil.*

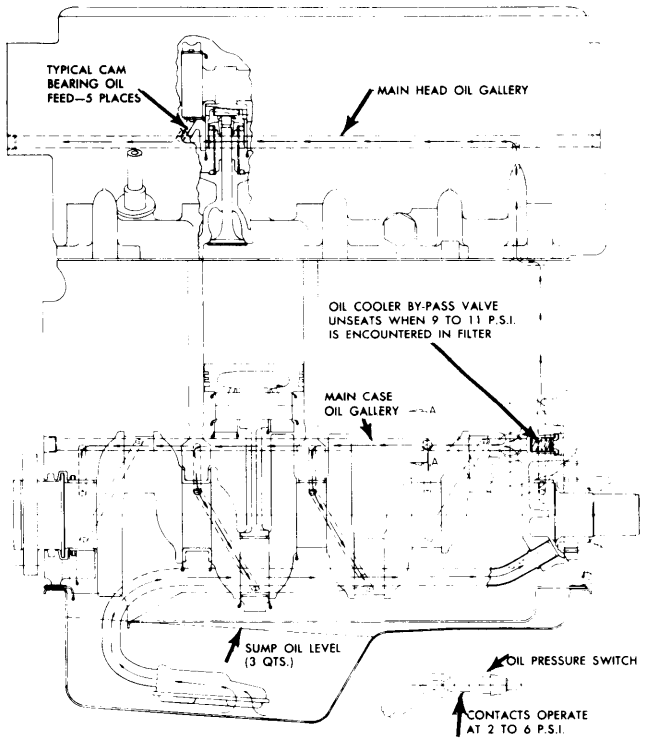
ENGINE OILING

Crankcase Capacity – 3 quarts. Add 1 quart with filter change.

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

Normal Oil Pressure – 40 psi @ 1000 RPM.

Pressure Regulator Valve – In oil pump body. Not adjustable.



ENGINE OILING

ENGINE OILING SYSTEM

All oil from the oil pump passes through a full-flow oil filter and into a main gallery on left side of block. Main and rod bearings are oiled directly from main gallery. Overhead oiling for camshaft and valve train is from front main bearing, which acts as metering device, through vertical passages in block and head to the camshaft bearings. Oil from cam bearings lubricates valve train, tappets and adjusters. One of four drainback passages has a tubular extension to assure positive drain-back directly to oil pan.

OIL PUMP (CRANKCASE FRONT COVER)

Inspection – Disassemble pump and thoroughly clean all parts. Check clearances given in following table.

Measurement	Clearance
Outside dia. of driven gear & pump	.0038-.0068"
Outside dia. of drive gear & crescent	.0023-.0093"
Inside dia. of driven gear & crescent	.0068-.0148"
Gear end clearance	.0009-.0023"

Pump gears and body are not serviced separately. If pump gears or body are worn, replace entire pump assembly.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Cylinder Head	60
Clutch Pressure Plate	20
Camshaft Retainer	15
Connecting Rod Cap	35
Clutch Housing	25
Crankshaft Damper-to-Sprocket	15
Crankshaft Damper-to-Crankshaft	80
Camshaft Sprocket	80
Fan Blades	20
Flywheel	60
Manifolds	30
Main Bearing Cap	65
Oil Pan	15
Oil Pump	15
Water Pump	15
Water Outlet	30