GENERATOR & REGULATOR SPECIFICATIONS

Generator						Regulator					
			Gen. Output				Cutout Relay				
Gen. No. ①	Rotation and Ground Polarity ③	Brush Spring Tension, Oz.	Amps.	R.P.M.	Field Current	Reg. No. ②	Closing Voltage	Arm. Air Gap, In.	Voltage Setting	Current Setting	Current & Voltage Reg. Arm. Air Gap, In.
GJC-7004A	C-N	18-36	30	2150	1.2-1.3⑤	VRX-6201A	13.4	.032	14.6	36	.050
GJC-7005A	C-N	18-36	30	2150	1.2-1.3⑤	VRX-6201A	13.4	.032	14.6	36	.050
GJC-7012B	C-N	18-36	30	2150	1.2-1.3⑤	VRX-6201A	13.4	.032	14.6	36	.050
GJC-7012C	C-N	18-36	30	2150	1.2-1.3⑤	VRX-6201A	13.4	.032	14.6	36	.050
GJC-7012D	C-N	18-36	30	2150	1.2-1.3⑤	VRX-6201A	13.4	.032	14.6	36	.050
GJC-7012E	C-N	18-36	30	2150	1.2-1.3⑤	VRX-6201A	13.4	.032	14.6	36	.050
GDZ-4801C	C-P	35-53	35	2000	1.3-1.5④	VRP-4001A	6.5	.032	7.2	35	.050
GDZ-4801D	C-P	35-53	35	2000	1.3-1.5④	VRP-4001A	6.5	.032	7.2	35	.050
GDZ-4801R	C-P	35-53	35	2000	1.3-1.5④	VRP-4001A	6.5	.032	7.2	35	.050
GDZ-4802A	C-P	35-53	35	2000	1.3-1.5④	VRP-4503A	6.5	.032	7.2	35	.050
GGW-6001A	C-P	35-53	45	2125	1.4-1.5④	VRP-4503B	6.5	.032	7.2	40	.050
GGW-6001B	C-P	35-53	45	2125	1.4-1.5④	VRP-6004A	6.5	.032	7.2	40	.050
GGW-6001C	C-P	35-53	45	2125	1.4-1.5④	VRP-6004A	6.5	.032	7.2	40	.050
GGW-6001H	C-P	35-53	45	2125	1.4-1.5④	VRP-4503B	6.5	.032	7.2	40	.050
GGW-6001J	C-P	35-53	45	2125	1.4-1.5④	VRP-6004A	6.5	.032	7.2	40	.050
GGW-6001K	C-P	35-53	45	2125	1.4-1.5④	VRP-6004A	6.5	.032	7.2	40	.050
GGW-6001Z	C-P	35-53	45	2450	1.3-1.5④	VBE-6201A	6.5	.032	7.2	45	.050
GGW-6002A	C-P	35-53	45	2125	1.4-1.5④	VRP-4503B	6.5	.032	7.2	40	.050
GGW-6002C	C-P	35-53	45	2125	1.4-1.5④	VRP-6004A	6.5	.032	7.2	40	.050
GGW-6002D	C-P	35-53	45	2450	1.3-1.5④	VBE-6201A	6.5	.032	7.2	45	.050
GGW-6002E	C-P	35-53	45	2450	1.3-1.5④	VBE-6201A	6.5	.032	7.2	45	.050
GGW-6010A	C-P	35-53	45	2125	1.4-1.5④	VBE-6001A	6.5	.032	7.0	45	.050
GGW-6011A	C-P	35-53	45	2125	1.4-1.5④	VRP-6004A	6.5	.032	7.2	40	.050
GGW-6012A	C-P	35-53	45	2125	1.4-1.5④	VBE-6001A	6.5	.032	7.0	45	.050
GGW-6013A	C-P	35-53	45	2125	1.4-1.5④	VBE-6001A	6.5	.032	7.0	45	.050

① Stamped on plate riveted to housing.
② Stamped on regulator base.
③ C—Clockwise. CC—Counterclockwise. P—Positive. N—Negative.
④ At 5 volts.
⑤ At 10 volts.

Engine Section

ENGINE, REPLACE

1949-53 Except C.O.E. Models

1. Take off the hood.
2. Drain cooling system.
3. Remove headlamps.
4. Remove radiator tie rods.
5. Remove radiator hose.
6. Remove radiator shell, radiator core, hood lower side panels and both front fenders as a complete assembly.
7. Remove mat and floorboard.
8. Disconnect propeller shaft.
9. Remove transmission.
10. Remove clutch and brake pedals.
11. Disconnect choke, throttle linkage and vacuum lines.
12. Disconnect exhaust pipe at manifold.
13. Disconnect heat indicator tube and bulb at cylinder head.
14. Disconnect oil gauge line at flexible tube.
15. Disconnect starter cable at starter.
16. Disconnect coil wires.
17. Disconnect windshield wiper hose.
18. Disconnect generator wires.
19. Disconnect starter linkage.
20. Disconnect carburetor-to-brake booster line check valve.
21. Remove carburetor air cleaner, horn, breather pipe, ignition coil and brake master cylinder.
22. Remove engine mounting bolts.
23. Lift out engine assembly.
24. Reverse the foregoing procedure to install the engine. The exhaust pipe bracket should be loosened and the engine allowed to run a few seconds before tightening engine mounting bolts and exhaust pipe support brackets. This is important for correct engine alignment.

1949-56 C.O.E. Trucks

1. To remove the engine and transmission without removing the cab, proceed as follows:
2. Drain cooling system.
3. Remove hood.
4. Remove radiator, grille and front fenders as a unit.
5. Remove floor mat and floor boards.
6. Disconnect choke, throttle linkage and vacuum lines.
7. Disconnect generator and horn wires, battery ground cable and coil wires.
8. Remove generator.
9. Disconnect hand brake linkage.
10. Remove body-to-fender tie bar.
11. Remove carburetor air cleaner and driver's seat.
12. Remove crankcase filler pipe.
13. Disconnect universal joint at rear of transmission and install a roller jack under transmission.
14. Disconnect exhaust pipe and carburetor air cleaner pipe.
15. Disconnect clutch and brake pedal.
16. Disconnect oil filter lines.
17. Disconnect oil gauge line at engine.
18. Disconnect brake line to master cylinder.
19. Disconnect thermostat plug from cylinder head.

20. Disconnect speedometer cable at transmission.
21. Disconnect shifting bar.
22. Remove engine support bolts.
23. Install engine lifting fixture.
24. Drain engine oil and remove crankcase.
25. Remove exhaust pipe.
26. Remove crankcase breather pipe.
27. Drop one end of tie rod and swing it out of the way to permit additional travel of the roller jack.
28. Have a helper under the truck push the jack forward gradually while lifting the engine with a chain hoist at the front. When the engine has been moved ahead as far as possible. lower the chain hoist so the engine rests on the front bumper. Keep the jack in place under the transmission and have a helper steady the engine in this position. Then reinstall the engine lifting hook as near the rear of the engine as possible so the engine and transmission will be nearly balanced. Gradually lift the engine with the chain hoist and at the same time have the helper under the truck push the jack forward until the engine and transmission clears the frame cross member and front bumper.
29. To install, reverse the foregoing procedure and bleed the brakes.

1954-56 Six-Cylinder Models (Except C.O.E.)

1. Drain cooling system.
2. Remove battery.
3. Disconnect light wires at both front junction connections.
4. Remove bolts from radiator support.
5. Remove hood center and side panels as a unit.
6. Open both cab doors and note four access holes in each front door pillar. Remove four bolts through access holes (bolts attach fender housing to door pillars).
7. Disconnect upper and lower radiator hoses.
8. Lift fenders, grille panel and radiator from truck as a unit.
9. Remove floor mat and floorboard.
10. Disconnect propeller shaft at front universal joint.
11. Disconnect hand brake.
12. On models with steering column gearshift, disconnect rods at transmission.
13. Remove transmission.
14. Disconnect clutch yoke by removing clevis pin.
15. Disconnect flexible line at fuel pump.
16. Disconnect exhaust pipe at manifold.
17. Disconnect throttle and choke controls.
18. Disconnect heat indicator lead wire.
19. Disconnect oil gauge line at oil line flexible tube.
20. Disconnect starter cable at starter.
21. Disconnect wires from coil.
22. Disconnect windshield wiper hose (if equipped).
23. Disconnect generator wires.
24. Disconnect starter pedal linkage (if equipped).
25. If equipped with brake booster, disconnect carburetor-to-brake booster line check valve.
26. If equipped with air brakes, disconnect air lines at compressor.
27. Disconnect horn wires.
28. Remove carburetor air cleaner, breather pipe and ignition coil.
29. Install an engine lifting bracket on the engine and attach a chain hoist hook to the bracket. Pull chain hoist tight.
30. Remove engine support bolts and lift out the engine.
31. To install, reverse the foregoing procedure.

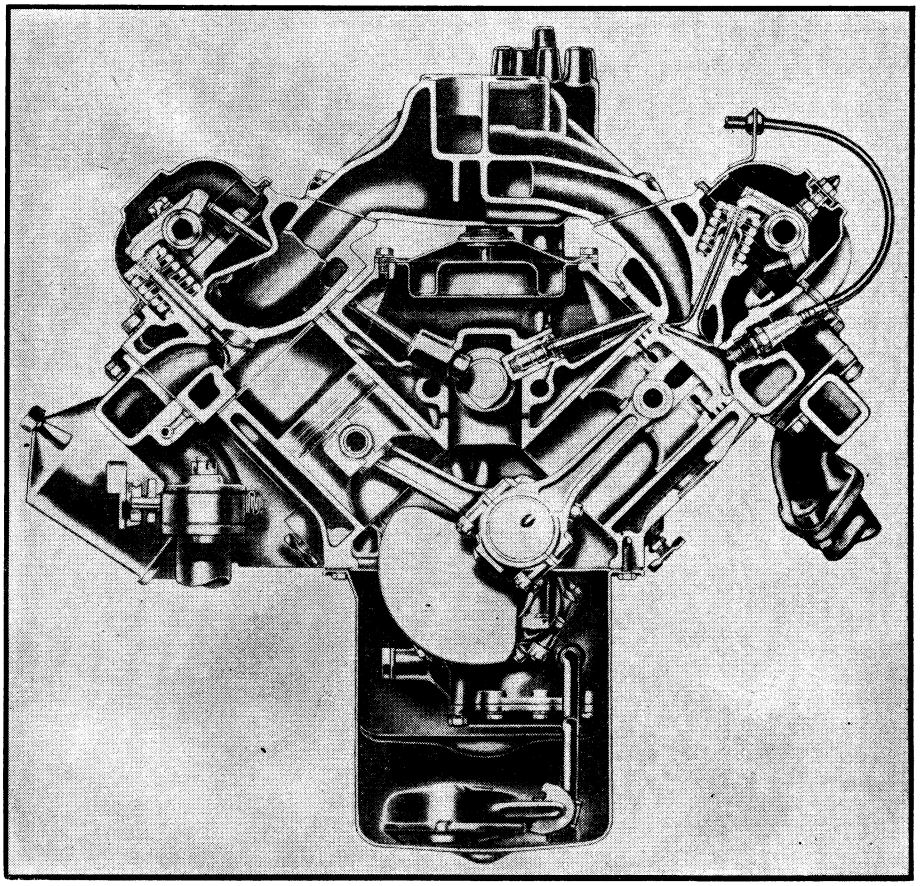

Fig. 2 Single rocker arm V8 engine. 1954-58

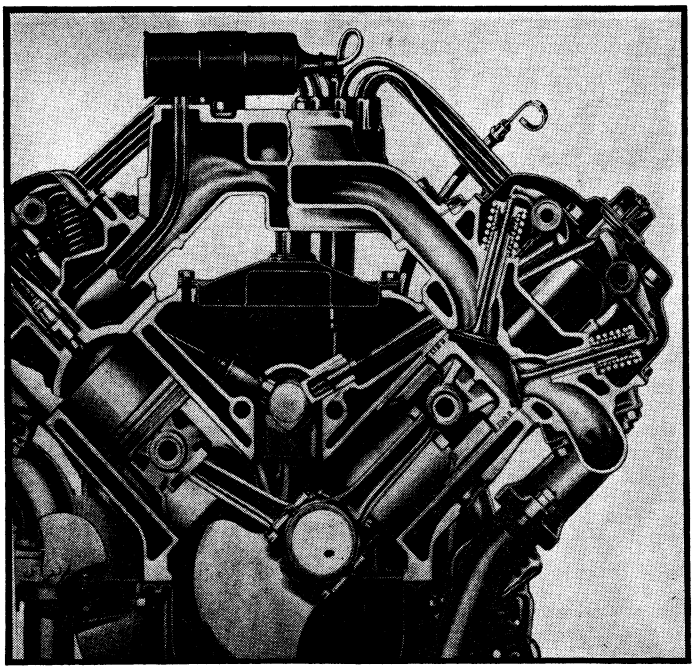

Fig. 1 Double rocker arm V8 engine. 1954-58

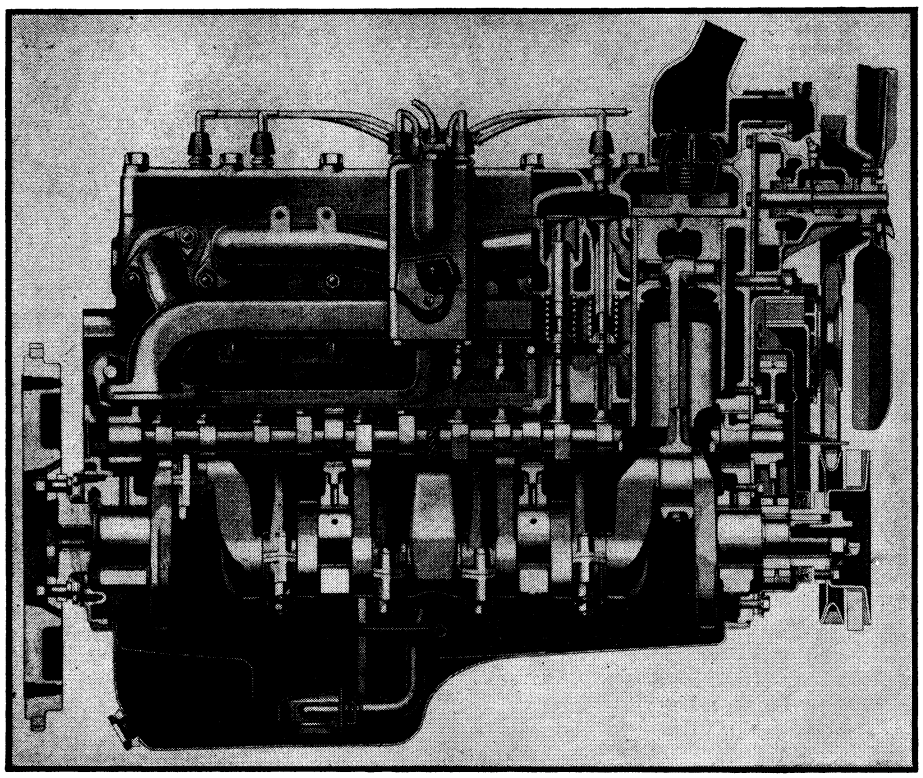

Fig. 3 Typical light duty six-cylinder engine

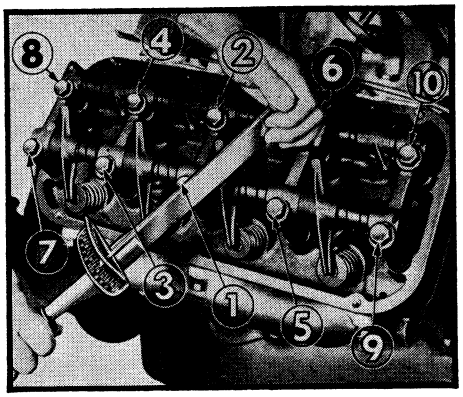

Fig. 4 Cylinder head tightening sequence. Double rocker arm V8 engine. 1954-58

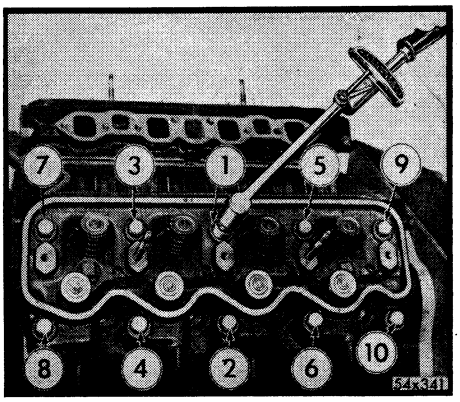

Fig. 5 Cylinder head tightening sequence. Single rocker arm V8 engine. 1954-58

1954-56 V8-241 & 270 Engines

1. Drain cooling system and oil pan.
2. Disconnect battery, fuel line, electrical connections, and heater duct (if equipped).
3. Remove radiator and front end sheet metal assembly.
4. Remove exhaust pipes.
5. Remove floor cover over transmission.
6. Remove carburetor and attach a suitable engine lifting fixture (Tool C-3162) to carburetor flange studs on intake manifold. Attach chain hoist to fixture eyebolt and pull chain tight.
7. Remove transmission.
8. Remove engine rear support cross member mounting bolts.
9. Remove engine front mounting bolts.
10. Raise engine and at the same time work engine out of chassis toward left front.
11. To install, reverse foregoing procedure.

1955-56 V8-259 Engine

1. Drain cooling system and crankcase.
2. Disconnect battery, fuel line, electrical connections, heater duct (if so equipped), upper and lower radiator hoses, and oil cooler hoses on Powerflite models.
3. Remove radiator and front end sheet metal.
4. Remove exhaust pipes.
5. Attach a chain hoist to engine and pull chain tight.
6. Remove floor mat and floor cover over transmission.
7. On Powerflite models, drain transmission and torque converter.
8. Place jack under rear of engine.
9. Disconnect propeller shaft, speedometer cable, hand brake cable, neutral starter switch wires, back-up light wires and control rods from transmission.
10. Apply hand brake and loosen universal joint companion flange nut.
11. Remove engine front and rear mounting bolts and nuts.
12. Raise rear of engine slightly and remove engine rear support crossmember.
13. On Powerflite models, remove frame center crossmember under transmission.
14. While raising the front and lowering rear end of engine, work engine and transmission forward and up out of chassis.
15. Reverse removal procedure to install engine and transmission.

1954-56 V8-331" Engine

1. Drain cooling system and crankcase.
2. Remove radiator and front end sheet metal assembly.
3. Disconnect clutch linkage and remove transmission.
4. Disconnect negative cable at battery.
5. Disconnect battery cable and lead wires at starter switch, and at generator and distributor.
6. Disconnect fuel lines and remove carburetor air cleaner.
7. Remove carburetor and attach a suitable lifting fixture (C-3060) to carburetor flange studs on intake manifold and attach chain hoist to fixture.
8. Place jack under clutch housing to relieve weight.
9. Remove engine rear support cross member.
10. Remove engine front mounting bolts.
11. Remove jack from under clutch housing.
12. Lift out engine.
13. Reverse the foregoing to install.

1957-58 6-Cyl. & V8 (Except C.O.E. Models)

1. Drain cooling system.
2. Disconnect battery and close fuel tank shut-off valve (if so equipped).
3. Disconnect front light wires and upper and lower radiator hoses.
4. Remove front sheet metal and radiator as a unit.
5. Remove floor boards from driver's compartment.
6. Disconnect propeller shaft at front universal joint.
7. On models equipped with steering column gear shift, disconnect gear shift and selector rods at transmission.
8. Remove transmission.
9. Disconnect clutch yoke by removing cotter key and pin.
10. Disconnect fuel line, wiring and carburetor controls.
11. Remove carburetor, breather pipe and ignition coil.

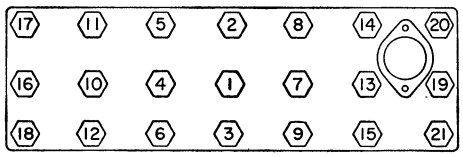

Fig. 6 Cylinder head tightening sequence. Six-cylinder engines with 21-bolt head

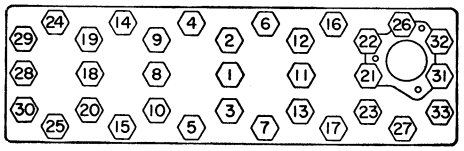

Fig. 7 Cylinder head tightening sequence. Six-cylinder engines with 33-bolt head

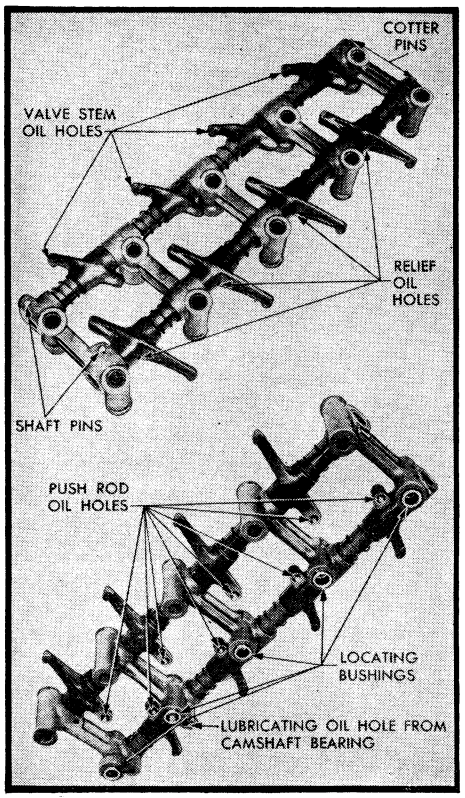

Fig. 8 Top and bottom view of double rocker arm assembly. 1954-58 V8 engine

12. Remove engine from chassis.
13. Reverse removal procedure to install.

1957-58 C.O.E. Models

1. Drain cooling system.
2. Disconnect battery and close fuel shut-off valve (if so equipped).
3. Remove hood center panel.
4. Disconnect front light wires and lower radiator hoses.
5. Remove bumper guards.
6. Lift off grille panel and radiator as a unit.
7. Remove floor boards from driver's compartment.

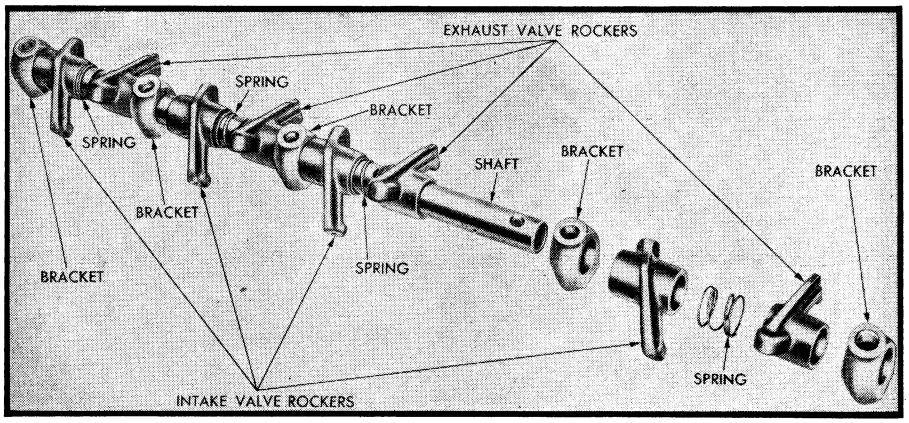

Fig. 9 Layout of single rocker arm parts. 1954-58 V8 engine

8. Remove shift lever, hand brake linkage, battery cable, starter wires, speedometer cable and electric shift control.
9. Disconnect propeller shaft at front universal.
10. Remove transmission.
11. Disconnect both exhaust pipes at manifolds; also holding brackets.
12. Disconnect oil filter lines (if filter is not mounted on engine).
13. Remove vertical clutch linkage.
14. Remove carburetor and its controls, heat indicator lead wire, oil gauge line, brake air compressor tubes at frame and fire wall (if so equipped), and high and low tension wires.
15. Remove engine supports and lift engine from chassis.
16. Reverse above procedure to install the engine.

CYLINDER HEAD, REPLACE

V8 Engines

Before the cylinder head is removed, first remove the rocker shaft assembly. Slide out the push rods and place them in a numbered rack so that each push rod can be reinstalled in its original position.

When installing a cylinder head, always use new gaskets. Make sure all holes are punched through. Be sure cylinder head enters both dowel guide pins in the cylinder block. Tighten cylinder head bolts in the manner described below.

Extreme care must be exercised when tightening rocker shaft bolts and nuts so that the hydraulic lifters have time to bleed down to their operating length. If the lifters are forced down rapidly, damage to the push rods, lifter bodies or rocker arms will result.

Six-Cylinder Engines

When installing the cylinder head, always use a new gasket. Coat the threads of the cap screws with sealer except those that lead into the intake manifold ports. If a sealer is used on these cap screws, there is a possibility that it will be drawn into the carburetor or valves.

Torquing Sequence, All Engines

Cylinder head bolts should be tightened down in the sequence shown in Figs. 4, 5, 6 and 7, and to the torque loads listed in *the Tune Up & Valve Specifications* table. Tighten all bolts evenly the first time around to a torque of 35 lb. ft. Repeat the tightening procedure and tighten the bolts in sequence to the specified torque. Run the engine until normal operating temperature is reached. Then recheck all cylinder head bolts and tighten to the specified torque.

ROCKER ARM SERVICE

V8 Engines

Sludge and gum formation in the rocker arms and shafts will restrict the normal flow of oil to the rocker arms and valves. Each time the rocker arm and shaft assemblies are removed they should be disassembled and thoroughly cleaned.

When disassembling rocker arms, place all parts on the work bench in their proper sequence to insure correct assembly, Figs. 8 and 9.

Clean all sludge and gum formation from the inside and outside of the shafts. Clean oil holes and passages in the rocker arms and shafts. Inspect the shafts for wear.

VALVES, ADJUST

Six-Cylinder Engines

As a preliminary cold setting, adjust the tappets to .010" on intakes and approximately .003" less than the hot clearance setting for exhaust valves. To obtain an accurate cold setting, adjust each tappet when the cam nose is down. If clearance is set when the tappet is part way up the quieting ramp on the cam, excessive clearance will result when the cam comes down.

When adjusting, be sure the feeler stock is flat and of the correct thickness. The use of old feeler stock that is bent or torn can result in an improper adjustment.

Finish checking the clearance when the engine is at normal operating temperature and running at normal idling speed. Then adjust the tappets to the

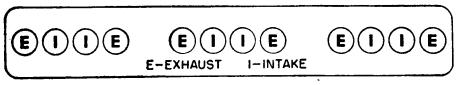

Fig. 10 Valve arrangement for 265 and smaller six-cylinder engines

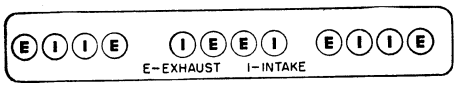

Fig. 11 Valve arrangement for 281 and larger six-cylinder engines

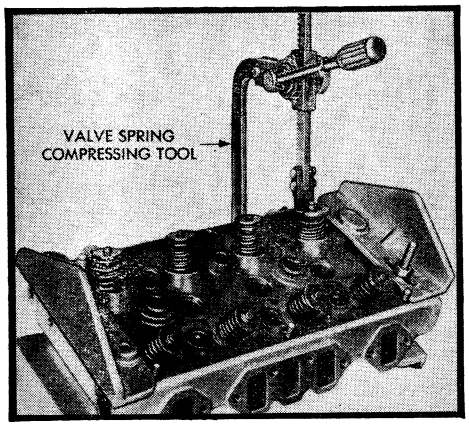

Fig. 12 Removing valves from V8 engines

clearances listed in the *Tune Up & Valve Specifications* table.

If the truck is to be operated at high speeds for long periods, an additional .002" clearance may be desirable. Be sure the engine is running and hot when allowing for this additional clearance.

VALVES, REMOVE

Six-Cylinder Engines

After taking off the cylinder head, remove the valve chamber covers and use a cloth to block off the holes in the valve chamber to prevent the valve locks from falling into the crankcase.

With a suitable valve spring compressor, raise the springs on those valves which are closed and remove the valve locks. Then turn the crankshaft until those valves which are open are closed and remove the remaining valve locks.

Remove all valves and place them in a board with numbered holes so that they can be identified as to the valve port from which they were removed.

Figs. 10 and 11 show the arrangement of the valves in the engine.

V8 Engines

After removing the cylinder head and rocker arm assemblies, use a suitable spring compressor, Fig. 12, to compress the springs. Remove the valve locks and springs, Figs. 13 and 14. Check the keeper grooves in the valve stems for burrs and remove any burrs with a file to prevent scoring of valve guides.

Remove the valves and place them in a board with numbered holes so they can be replaced in the same valve port from which they were removed.

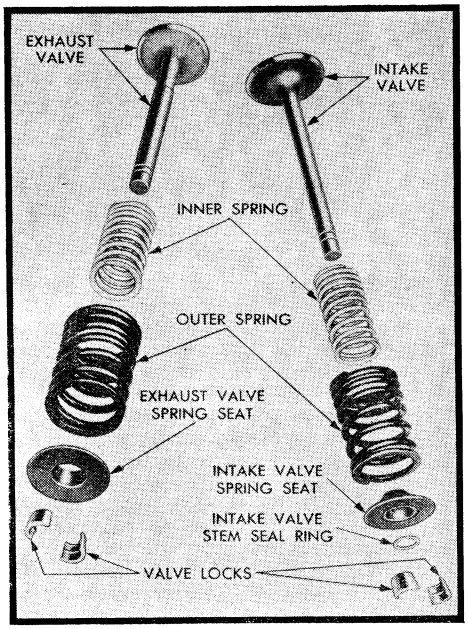

Fig. 13 Layout of valves and related parts. Typical of all double rocker arm V8 engines

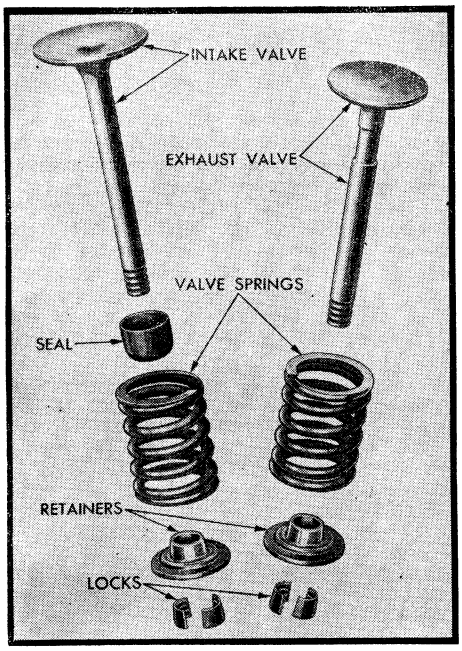

Fig. 14 Layout of valves and related parts. Single rocker arm V8 engines

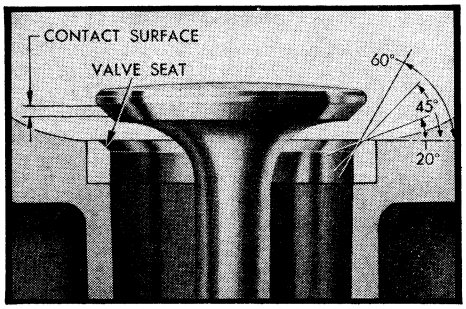

Fig. 15 Valve grind details. All engines

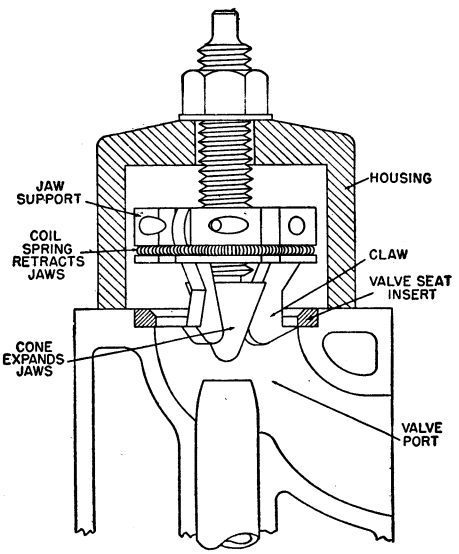

Fig. 16 Typical valve seat insert puller

VALVES, GRIND

All Engines

Clean the valves with a wire wheel brush, making sure that all carbon is removed from the top and bottom of the heads as well as the gum which might have accumulated on the stems.

In refacing valves, take off only the minimum of metal required to clean up the valve faces. If the outer edge of the valve becomes too thin or sharp due to excessive grinding, the valve must be replaced. In other words the valve head margin must be at least $\frac{3}{64}$", otherwise the valve must be replaced. This margin is the area above the contact surface of the valve face, Fig. 15.

Inspect the valve seats in the block or head for cracks, burns, pitting, ridges or improper angle. During any general engine overhaul it is advisable to reface the valve seats regardless of their condition. If new valve guides are required, they must be installed and reamed before refacing the seats if the equipment used for refacing the seats has a valve guide pilot.

The valve seat width after refacing should be a liberal $\frac{1}{16}$" for intake seats but not more than $\frac{3}{32}$" in any case. The width of exhaust seats should be $\frac{3}{64}$" to a liberal $\frac{1}{16}$".

A simple check can be made to prove the fit of the valve in the valve seat by spreading a thin film of Prussian Blue on the valve face and then inserting the valve in the valve seat. With hand pressure, rotate the valve $\frac{1}{4}$ turn remove it and observe the transfer of Prussian Blue to the valve face. An uneven transfer of Prussian Blue will indicate an inaccurate valve and valve seat refacing operation.

VALVE SEAT INSERTS

Since these inserts are too hard to reface by ordinary hand grinding methods, a high speed grinder or special lapping equipment should be used to

Fig. 17 Fixture and torque wrench for checking valve spring tension

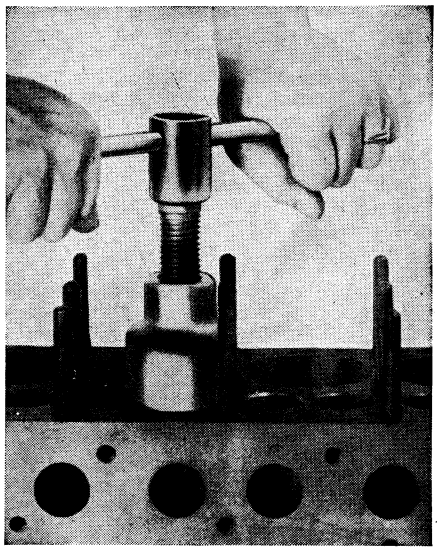

Fig. 18 Valve guide removing tool. Six-cylinder engines

perform this operation. When using this equipment, be sure valve guides are clean and the valve guide pilot is a snug fit in order to assure a concentric seat. Finished seats should be checked with a dial indicator and runout should not exceed .001".

To remove an insert, if a suitable puller, Fig. 16, is not available, drill two holes at opposite sides of the insert, but not all the way through. Then cut through the undrilled portion with a sharp chisel to remove the two pieces.

To install a new insert, first remove all burrs and sharp edges from the counterbore in the head or block. Then chill the new insert with dry or wet ice to obtain maximum contraction of the metal and drive it in place.

If a standard insert is too loose (less than .002" press fit) a .010" oversize insert is available. Before it can be installed, however, the counterbore in the block or head must be machined to fit the new insert.

VALVE SPRINGS

All Engines

After removing the valve springs, wash them with gasoline or other suitable solvent. Examine the springs for damage or corrosion due to acid etching, which will develop into surface cracks and cause spring failure.

Check the valve spring tension on a spring tension fixture, Fig. 17, if one is available. If not available, at least check the free length of each spring by standing it alongside a new spring. Any spring that does not conform to the pressure specifications given in the *Tune Up & Valve Specifications* table within 10% should be replaced. Likewise, any spring that stands shorter than the new spring used for comparison should be discarded. Of course, cocked springs should be scrapped.

VALVE GUIDES

All Engines

Clean the valve guides with a wire guide brush and check the clearance between valve stems and guides. Excessive clearance between valve stems and guides will cause improper seating and burned valves. When there is too much clearance between intake valve stems and guides, there is a tendency to draw oil vapor through the guide on the suction stroke, causing excessive oil consumption, fouled spark plugs and poor low speed performance.

Valve stem-to-guide clearance may be checked with a dial gauge or a suitable plug gauge. Lacking either of these tools, take a new valve and place it in each guide and feel the clearance by moving the valve stem back and forth. If this check indicates excessive clearance, it will be necessary to correct the condition as outlined below.

If the clearance is not excessive when checking with a new valve but is excessive when checked with the old valve, the old valve stem is worn and a new valve must be installed.

V8 Double Rocker Arm Engines & 6-Cyl. Engines

Valve guides in 6-cylinder engines may be removed and installed with the tools shown in Figs. 18 and 19. On V8 engines with double rocker arms, the guides may be removed and installed with special drivers designed for the purpose.

After the new guides have been installed, they should be reamed to round out the holes and to provide adequate operating clearances, Fig. 20.

V8 Engines With Single Rocker Arms

These engines do not have removable valve guides, the valves operating in guide holes bored in the cylinder head. Valves with oversize valve stems are available for service replacement when necessary to ream the guide holes.

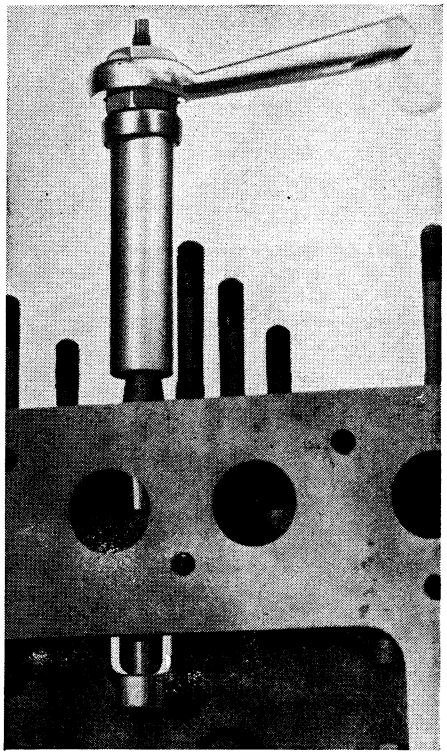

Fig. 19 Valve guide installing tool. Six-cylinder engines

Standard production reaming of both intake and exhaust valves is .374-.375". When reaming guides for oversize valve stems do not attempt to ream from standard to .090" oversize. If necessary to ream to that size, use the step procedure of .005", .015" and .030". This must be done in order to maintain a true relationship of the guide to the valve seat. The following chart indicates reamer size and valve stem size.

Reamer Oversize	Valve Stem Size
.005"	.379-.380"
.015"	.389-.390"
.030"	.404-.405"

If an "I" or an "E" is stamped on the cylinder head at the rocker cover gasket boss, all intake and exhaust valves are oversize in that bank, depending upon what letter is stamped.

MECHANICAL VALVE LIFTERS

6-Cyl. Engines

In some of the larger engines, valve lifters are carried in removable guide clusters bolted to the cylinder block. When lifters are worn it is usually easier to replace the entire lifter and bracket cluster rather than try to use the old lifters with new brackets and vice versa.

On engines without removable lifter guide brackets, the lifters may be re-

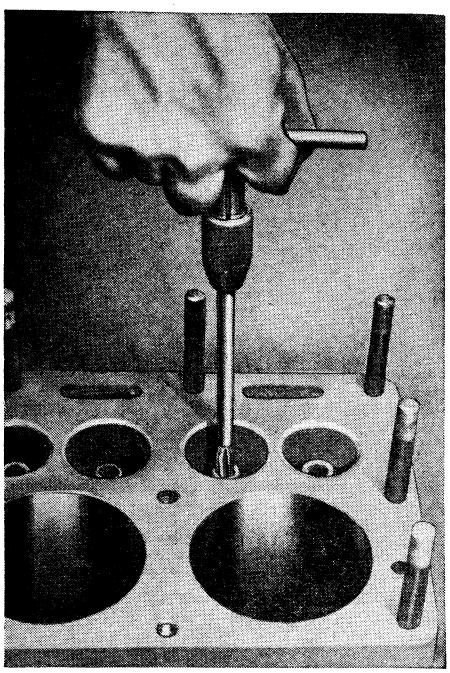

Fig. 20 Valve guide expansion reamer

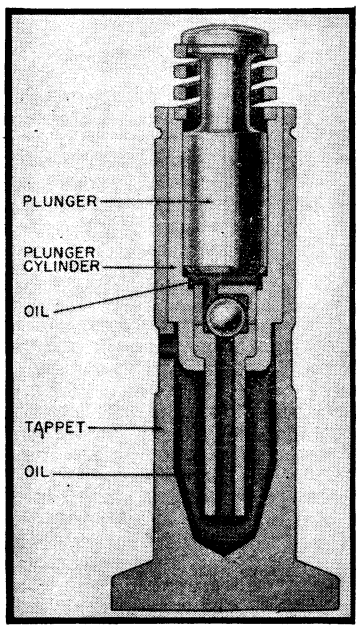

Fig. 21 Hydraulic valve lifter used on some 281 and larger six-cylinder engines

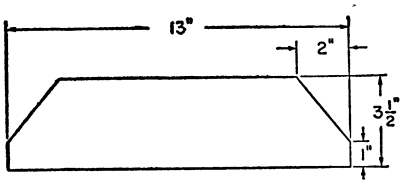

Fig. 22 Valve lifter guide installing plate for 281 and larger six-cylinder engines

moved, the guides reamed and oversize lifters installed. Oversizes of .001", .008", .030" and .060" are available. To remove lifters from these engines, it is necessary to take out the camshaft, remove the oil pan and take the lifters out through the bottom of the engine.

When reaming lifter guides, the cylinder head and valves will have to be removed so that the reamer pilot can be inserted through the valve stem guide hole.

HYDRAULIC VALVE LIFTERS

6-Cyl. Engines

Installed in some of the larger engines (those with removable valve lifter guide brackets) are hydraulic valve lifters of the type shown in Fig. 21. To remove either of the lifter and guide assemblies, proceed as follows:

1. Remove valve cover plates.
2. Turn crankshaft until all lifters in the guide bracket are in the lowest position.
3. Bend locking tabs away from guide bracket attaching bolts and remove bolts.
4. Make certain that the small wire retaining rings are in place on each lifter to prevent lifter from dropping out of guide.
5. Insert a suitable bar into one of the attaching bolt holes of the guide bracket and pry down and out to release the lifters from the valve stems.
6. After lifters are free from the valve stems, work the guide bracket out of the engine.

Service—The plunger is a select fit in the particular cylinder and *must never* be used in any other cylinder since the leak-down rate (metering of oil through lifter) is controlled by the clearance between these parts.

To properly handle hydraulic lifters and guides, construct a rack with holes in it large enough to hold the various parts. Place the parts in the rack as they are removed so that each unit can be reassembled as it was originally installed.

Disassembly—Remove the retaining rings from the lifters and take the lifters from the guides. Taking each lifter in turn, remove the cylinder by drawing it out of the lifter body. Remove the plunger by pulling outward and twisting in a clockwise direction. This will detach the spring from the recess in the cylinder body.

Inspection—Wash all parts and dry with compressed air. Examine the lifter face, body, plunger and cylinder for wear. If any of these parts show evidence of looseness or "galding", the complete unit should be replaced.

To test the ball check valve, suck on the oil inlet tube and seat the ball. If no leakage exists, the vacuum created will keep the tube attached to the tongue. If vacuum in the tube disappears, the complete lifter must be renewed since the ball check is leaking.

With plunger and cylinder dry and clean, place the plunger into the cylinder and squeeze them together between thumb and forefinger. The plunger should be springy and riding on a cushion of trapped air. If leakage is evident, clearance is too great and the complete lifter should be replaced. Make certain that the check ball valve is seated when making the latter test.

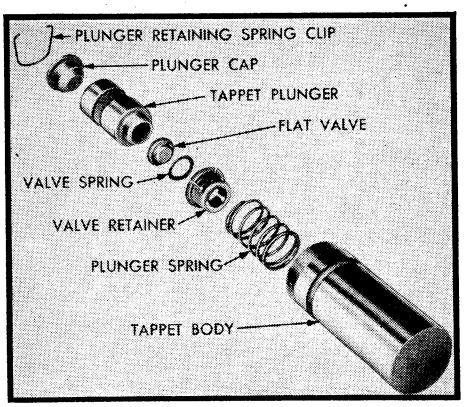

Fig. 23 Hydraulic valve lifter of the flat valve type. V8 engines

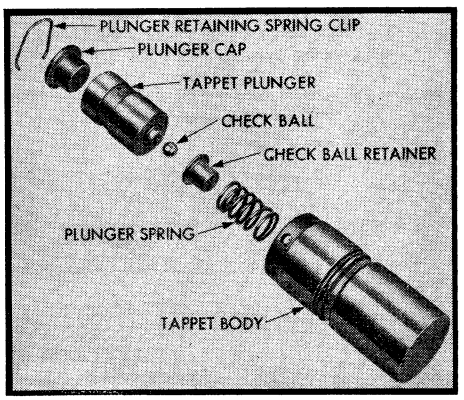

Fig. 24 Hydraulic valve lifter of the ball check type. V8 engines

Reassembly—Insert the plunger into the cylinder (dry) and turn clockwise, while pushing in until the spring seats in the counterbored recess in the cylinder. At the same time, release the trapped air by inserting a toothpick or wood match into the oil inlet tube to unseat the ball check valve. Insert plunger and cylinder in body. Then install the lifters into the proper location in the guide bracket and install the retaining rings.

Installation—Make certain the camshaft lobes are positioned so that all lifters for a particular assembly will be in the lowest possible position. Make an Installing plate to the dimensions shown in Fig. 22 from smooth sheet metal. Place the assembly in the engine and position the installing plate on top of the lifters and under the valve stems. Push the lifter guide assembly into place and align it with the cylinder block bolt holes. Remove the installing plate, and install the bolts and lock by bending up the corners of the locking plate.

Start the engine and make sure oil is reaching all lifters and that each lifter

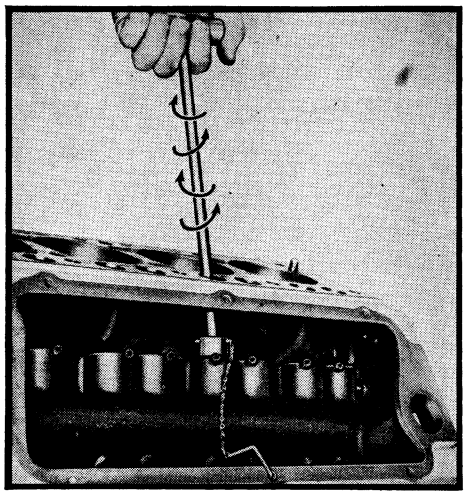

Fig. 25 Removing stuck hydraulic lifter with special tool. V8 engines

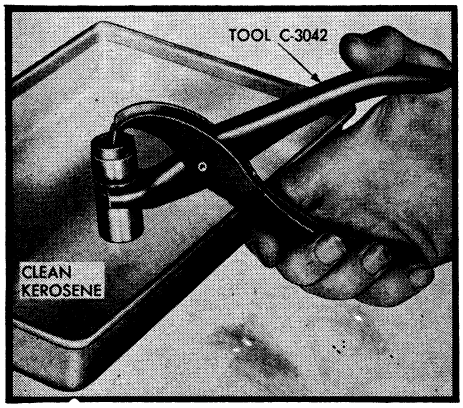

Fig. 26 Testing hydraulic valve lifter. V8 engines

is functioning properly. A properly working lifter will function without noticeable plunger spring action a few minutes after the oil pressure reaches them.

Install the cover plates, using new gaskets, and make sure there are no oil leaks.

V8 Hydraulic Lifters

Figs. 23 and 24 illustrate the type of hydraulic valve lifters used. Before disassembling any part of the engine to check for noise, check the oil pressure at the gauge and the oil level in the oil pan. The pressure should be between 40 and 65 pounds at 1500 rpm. The oil level in the pan should *never be above the "full"* mark on the dipstick, *nor below* the "add oil" mark. Either of the two conditions could be responsible for noisy lifters.

Oil Level Too High—If the oil level is too high it is possible that the connecting rods can dip into the oil when the engine is running and create foaming. This foam is fed to the hydraulic lifter by the oil pump, and air gets into the lifters, causing them to go flat and allow the valves to seat noisy.

Oil Level Too Low—Low oil level may allow the oil pump to take in air which, when fed to the lifters, causes them to lose length and allows the valves to seat noisily. Any leaks on the intake side of the oil pump through which air can be drawn, will create the same lifter action. When the lifter noise is due to aeration, it may be intermittent or constant, and it will always cause more than one lifter to be noisy. When the oil level and leaks have been corrected, the engine should be run at a fast idle for sufficient time to allow all of the air inside of the lifter to be worked out.

To determine the presence of lifter noise, remove the rocker arm covers and reinstall the spark plug wires. Run the engine at idle. Feel each rocker arm to determine which is noisy. The noisy lifter can readily be detected by feel. It should be remembered, however, that worn valve guides or cocked springs are sometimes mistaken for noisy lifters. If such is the case, the noise in all probability will be dampened by applying side thrust on the valve spring with a hammer handle. If the noise is not appreciably reduced, it can then be assumed that the noise is in the hydraulic lifter.

Valve lifter noise can be described as a "light noise" or a "heavy noise". A "light noise" is usually caused by excessive leakdown around the unit plunger or a partially sticking plunger in the cylinder.

A "heavy noise" is caused by either the valve not seating or by foreign particles becoming wedged between the plunger and cylinder, causing the plunger to stick in the down position. This "heavy noise", of course, will be further evidenced by clearance between the valve stem and rocker arm as the valve closes. A "light noise" caused by a lifter can be determined by pushing down the push rod end of the rocker arm. The noise will become more audible, and if the push rod end of the rocker arm is held down long enough, the intensity of the noise may increase. In either instance, the unit assembly should be removed for further inspection and cleaning.

Lifter, Replace

In removing a lifter, Chrysler Tool C-3158 is available for the operation. Insert the hooked portion of the tool in the lifter body. (This portion of the tool can be used to remove lifters without a varnish build-up around the bottom of the body). Lift the lifter out of the bore. If they are stuck, proceed as follows:

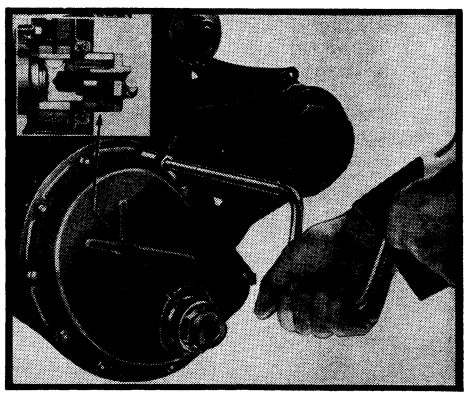

Fig. 27 Special centering tool for timing chain cover oil seal. For 265 and smaller six-cylinder engines

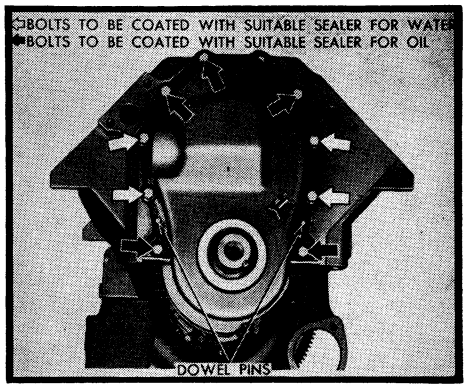

Fig. 28 Installing chain case cover. V8 chain-driven engines

Slide the puller portion of the tool through the cylinder head push rod holes and seat it firmly in the top of the lifter, Fig. 25. Insert the puller pin through the body and tool shaft in the holes provided. Grasp the tool handle and pull the lifter out of the bore. As the lifter clears the bore, withdraw the puller pin and remove the tool.

When installing hydraulic lifters in the engine, fill them with light engine oil (10W) to avoid excessive time required to quiet them during initial operation of the engine.

Servicing Lifters

Warning—Hydraulic plungers and bodies are not interchangeable. Therefore, it is advisable to work on one lifter at a time to avoid mixing parts. *Mixed parts will not function.* Moreover, do not mix check valves as they may be slightly worn and will fit only the plungers with which they have been operating.

Testing Lifters

In testing a lifter, secure a container deep enough to completely immerse the lifter assembly. Fill the container with clean kerosene. Remove the cap from the plunger and submerge the lifter. Allow the cylinder to fill with kerosene. Then remove the lifter and replace the cap.

Holding the lifter upright, insert the lower jaw of the pliers shown in Fig. 26 in the groove of the lifter body. Engage the upper jaw of the pliers with the top of the plunger cap as shown. Check the leakdown by compressing the pliers. If the plunger collapses almost instantly, disassemble the unit, clean it again and retest. If the lifter still does not function satisfactorily, install a new unit, being sure to test the new one before installing it in the engine.

TIMING CHAIN OR GEAR COVER

218, 230, 237, 251, 265 Six-Cyl. Engines

When installing the chain case cover on these engines, place a new gasket in the cover, then drive the oil seal in position, using a drift or a flat piece of metal slightly larger than the seal to assure a

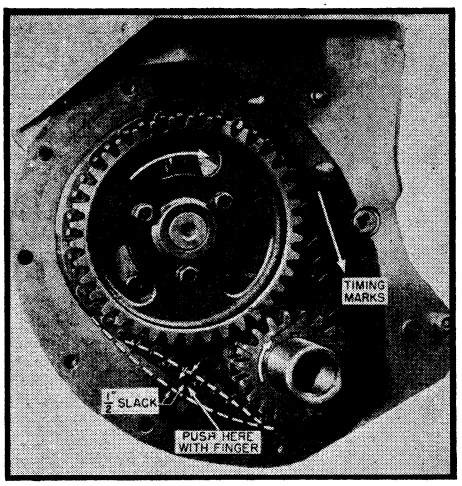

Fig. 29 Valve timing on six-cylinder chain-driven engines

tight, even contact between the seal and its seat.

When fastening the cover, care must be used to center the seal on the crankshaft before tightening the cover screws. A special centering tool, Fig. 27, is available to make the installation. When using this tool, first tighten the screws only enough to hold the cover in place. Then insert the tool, holding it by the crankshaft starting jaw, tightening the jaw nut only finger tight. As the cover screws are being tightened and the gasket is being compressed, tighten the jaw nut, maintaining a slight tension between the centering tool and the seal. Then remove the tool, install the starting jaw and tighten it to a minimum of 108 lb. ft. torque.

281, 306, 331, 377, 413 Six-Cyl. Engines

Check the pulley for burrs or other roughness that might damage the seal before installing the pulley on the cover. With a suitable driver, drive a new seal into the gear cover after coating the outer diameter of the seal with white lead or gasket sealer. Install a new cover gasket and the cover on the engine, being careful not to damage the seal. Install the capscrews and tighten them against the lock washers without compressing the lock washers.

Install the crankshaft pulley and pull it into the cover with the starting jaw nut. The pulley will align the seal and cover. Tighten the cover screws and starting jaw nut alternately until the cover screws are tightened to 15 lb. ft. torque. Then tighten the starting jaw nut to 135 lb. ft. minimum.

241, 259, 270 V8 Engines

Whenever the cover is removed be sure to install a new oil seal. And when installing the cover, guard against water and oil leaks as suggested in Fig. 28.

V8-331 & 354 Engines

Whenever the cover is removed, install a new seal, being sure the flange of the seal faces the inside of the cover. Drive the seal into the bore until it is well seated.

Be sure the mating surfaces of the gear cover and block are clean and free of burrs. Install a new gasket and position the gear cover over the locating dowels and tap into position with a soft hammer. Install the cover bolts and tighten to 35 lb. ft. torque.

TIMING CHAIN

Six & V8 Chain-Driven Engines

For correct valve timing, the timing chain and sprockets should be assembled as shown in Figs. 29 and 30.

If there is more than ½" slack in the chain as indicated in Fig. 29, replace the chain.

TIMING GEARS

Six & V8 Gear-Driven Engines

For correct valve timing, the timing marks on the camshaft and crankshaft gears should be matched. Fig. 31 shows the installation on V8 engine.

CAMSHAFT & BEARINGS

Six-Cylinder Engines

All camshaft bearings (except the rear) are removable. Replacement is usually performed when the engine is removed for overhaul. If the bearing clearance is excessive, finished bearings which require no reaming, scraping or burnishing, are available provided the proper tool, which draws all bearings into place at one time, is used.

The desired camshaft bearing clearance is .002-.004". To measure bearing wear, attach a dial indicator to the block with the plunger of the indicator resting on the camshaft nearest a bearing. Pry the shaft to and from the indicator so that this movement will be shown on the indicator. Check all bearings in the same manner. If the clearance exceeds .004", a new camshaft may be installed (for test purposes only) to recheck the bearings. With the new camshaft installed, clearance should not exceed .002". If it does, replace the bearings.

If bearings replacement is necessary, remove the fan drive pulley or vibration damper and timing chain or gear case cover. Lift the valves (if installed) and tappets and hold them up with clothespins, Fig. 32, or other suitable means. (On engines with removable tappet guide brackets, remove the brackets and tappets.) Pull out the camshaft.

Camshaft end play is controlled by a thrust plate behind the camshaft gear or sprocket. End play should be held to .006" and can be measured with a feeler gauge between the camshaft hub and thrust plate. If end play is excessive, press off the thrust plate and install a new one.

V8 Engines

If camshaft bearings are to be replaced the engine should be removed from the chassis and the crankshaft taken out in order that any chips or foreign matter may be removed from the oil passages.

Drive out the camshaft rear welch plug. Special equipment is required to remove and install camshaft bearings. This tool pulls out all the bearings at once and installs the new bearings at one time.

When installing bearings, be sure the oil holes in the bearing line up with the oil holes leading to the main bearings.

Install a new welch plug in the rear of the block. Install the thrust plate on the camshaft and press on the hub and key. The hub is properly installed when a feeler gauge .002-.006" can be inserted between the hub and thrust plate.

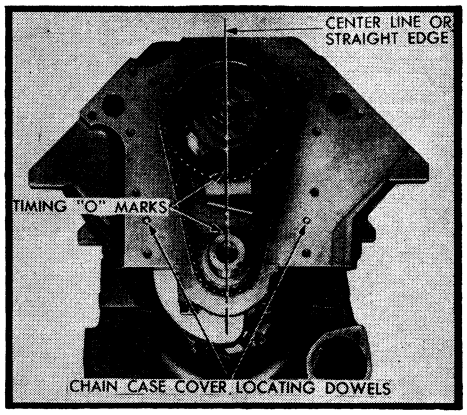

Fig. 30 Valve timing on V8 chain-driven engines

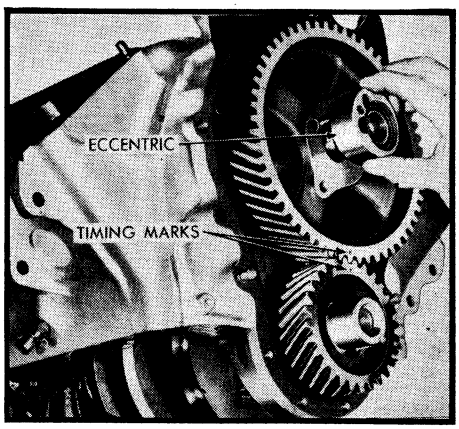

Fig. 31 Valve timing on V8 gear-driven engines. View shows fuel pump eccentric being installed

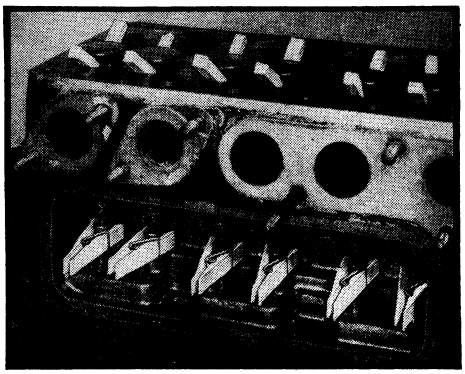

Fig. 32 Method of holding up valves and tappets for camshaft removal on six-cylinder chain-driven engines

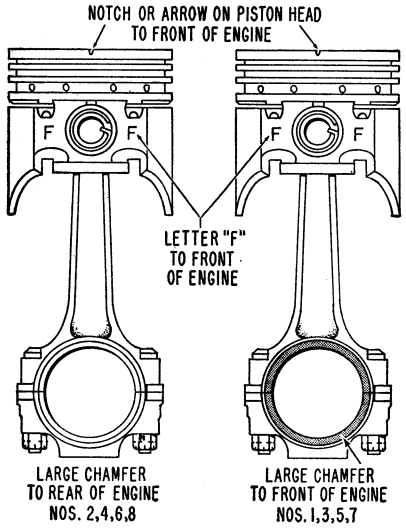

Fig. 32A Correct assembly of pistons and rods. V8 engines

PISTONS & RODS, REMOVE

All Engines

After removing the cylinder head and oil pan, examine the cylinder bores above the ring travel area. If the bores are worn so that a shoulder or ridge exists at this point, remove the ridge with a ridge reamer to avoid damaging rings or cracking ring lands of pistons during removal.

Remove the connecting rod caps and push the pistons and rods out of the cylinders, using care to prevent rod bolts from nicking crankshaft journals. Make sure rods and pistons are properly numbered so they can be reinstalled in the proper cylinders. It is advisable to install caps on rods to avoid mixing parts.

PISTON & ROD, ASSEMBLE

Six-Cylinder Engines

When assembling the piston to the rod, the slotted side of the piston should be opposite the oil hole in the rod. Install the assembly in the cylinder so that the oil hole in the rod is toward the valve side of the engine.

All V8 Engines

When installing piston and rod assemblies in the cylinders, the compression ring gaps should be diametrically opposite one another and not in line with the oil ring gap. The oil ring expander gap should be toward the outside of the "V" of the engine. The oil ring gap should be turned toward the inside of the engine "V".

Immerse the piston head and rings in clean engine oil and, with a suitable piston ring compressor, insert the piston and rod assembly into the bore. Tap the piston down into the bore, using the handle of a hammer.

Assemble and install the pistons and rods as shown in Fig. 32A.

PISTONS, REPLACE

All Engines

Before a honing or boring operation is started, measure all new pistons with a micrometer at points exactly 90 degrees away from the piston pin. Then select the smallest piston for the first fitting. The slight variation usually found between pistons in a set may provide for correction in case the first piston is fitted too free.

It is very important that refinished cylinder bores are trued up to have not more than .0005" out-of-round or taper. Each bore must be final honed to remove all stone or cutter marks and provide a smooth surface. During final honing, each piston must be fitted individually to bore in which it will be installed and should be marked to insure correct installation.

After final honing and before the piston is checked for fit, each bore must be thoroughly washed to remove all traces of abrasive and then dried thoroughly. The dry bore should then be brushed clean with a power-driven fibre brush.

Both the piston and cylinder block must be at the same temperature (room temperature of 70 degrees) when the piston is checked for fit in the cylinder bore. Therefore, the cylinder should be allowed to cool after boring or honing and before the piston fit is checked. This is important because a difference of 10 degrees between the temperature of parts is sufficient to produce a variation of .0005".

With the piston rings and pin removed and cylinder wall and piston clean, insert the piston upside down in the bore. Use a feeler ½" wide which is long enough to extend the full length of the piston. The thickness of the feeler should be the same as the clearance given in the *Pistons, Rings & Bearings* table. With the feeler hooked to a spring scale, a pull of 5 to 10 lbs. should be required to pull the feeler past the piston.

PISTON RINGS, REPLACE

All Engines

When new rings are to be installed without reboring cylinders, the glazed cylinder wall should be slightly dulled, but without increasing the bore diameter. This is done with a "Glaze-buster" or with a hone equipped with the finest grade of stones.

New piston rings must be checked for clearance in piston grooves and for gap in cylinder bores. The latter operation must be measured with the ring about two inches from the bottom of the cylinder bore to which it is fitted. An inverted piston can be used to push the rings down to this position. Cylinder bores and piston grooves must be clean, dry and free from carbon and burrs.

Check the clearance of each ring in its piston groove by installing the ring and then inserting feeler gauges *under* the ring. Any wear that occurs in the piston groove forms a step or ridge at the inner portion of the lower land. If the feeler gauge is inserted above the ring, the ring may rest on the step instead of on the worn portion of the lower land, and a false measurement of clearance may result.

If the piston grooves have worn to the extent that relatively high steps or ridges exist on the lower lands, the piston should be replaced because the steps will interfere with the operation of the new rings and ring clearances will be excessive. Piston rings are not furnished in oversize widths to compensate for ring groove wear.

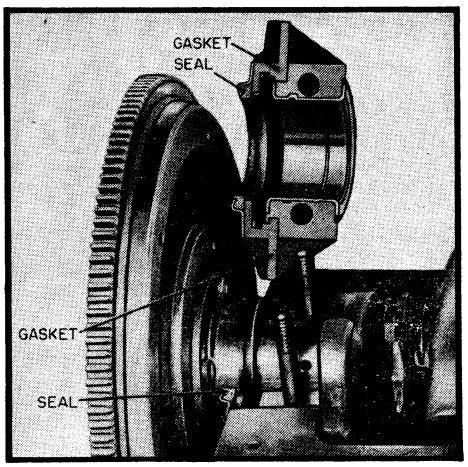

Fig. 33 Crankshaft rear oil seals. Six-cylinder engines

PISTON PINS, REPLACE

All Engines

The fit of both the piston and connecting rod should be a tight thumb press fit with the parts at normal room temperature.

When using an expansion reamer to fit piston pins, start off by taking a very light cut. Try the fit. Then ream and try the fit again until the pin can be pushed into the rod and piston as described above.

ROD BEARINGS, REPLACE

Six-Cylinder Engines

Rod bearings consist of two half shells. When the bearings are placed in the rod and cap the ends extend slightly beyond the parting faces so that when the rod bolts are tightened, the bearings will be clamped tightly in place to insure positive seating and prevent turning. *The ends of these bearings should never be filed flush with the parting surface of the rod and cap for the above reasons.*

Service bearings are provided in standard sizes and several undersizes, including undersizes for reground crankshafts.

After installing new bearings, the oil clearance may be checked with Plastigage which is available at any auto parts jobber. Full instructions for its use are furnished with the envelope in which it is contained.

V8 Engines

The method of fitting rod bearings as described below is accomplished without inserting the piston and rod in the cylinder bore, thereby eliminating any possible drag that might be caused between the piston and cylinder wall.

When fitting rod bearings, it is suggested that either the right or left bank be fitted first, as the position of the rods and pistons (as installed in the engine) are not interchangeable.

Limits on the taper or out-of-round on any crankshaft journal should be held to .001". Undersize bearings should be installed if the crankshaft journals are worn enough to increase the bearing clearance above specifications. Never install an undersize bearing that will reduce the clearance below specifications.

The desired rod bearing clearance is given in the chart and may be checked as follows:

Take each connecting rod one at a time and install the upper and lower bearing shell. It should be noted that each bearing cap has a small "V" groove across the parting face. When installing the lower bearing shell, make certain that the "V" groove in the shell is in line with the "V" groove in the cap. This is to allow lubrication of the cylinder wall.

Place a piece of .0015" for 241, 259 and 270 engines (.002" for 331) feeler stock (½" wide and ¾" long) between the bearing and crankshaft journal. Install the bearing cap and tighten nuts to the specified torque. Move the rod and piston from side to side. A slight drag should be felt as the rod is moved. This will indicate that the clearance is satisfactory. If, however, no drag is felt or the rod is difficult to move, the bearing is either too large or too small and should be replaced with the correct size. Fit the remaining bearings in the same manner.

MAIN BEARINGS, REPLACE

All Engines

Main bearings are of the insert type which can be removed and replaced without taking out the crankshaft.

Before installing new bearings, crankshaft journals should be examined for scoring, cracks, excessive wear or overheating. The journals of an overheated crankshaft will have a bluish tinge, which indicates that a new crankshaft should be installed. Check bearing caps for distortion, using an inside micrometer. Use a suitable brush to clean out the oil passages in both the crankshaft and crankcase. If possible, blow out the holes with compressed air.

Service Note, V8 Engines

The halves of numbers 1, 2 and 4 bearings are interchangeable with one another. The caps are not interchangeable and extreme care should be used in replacing them in their correct position. Number 3 bearing, which controls the crankshaft end thrust, is not interchangeable with the others. However, the upper and lower halves of No. 3 bearing are interchangeable with each other. No. 5 bearing halves are not interchangeable.

CRANKSHAFT END PLAY, ADJUST

All Engines

Crankshaft end thrust is taken on the flanges of the rear main bearing on six-cylinder engines, and by the flanges of the center main bearing on V8 engines.

Whenever new main bearings are installed, check the end play with a dial indicator or feeler gauge by measuring the space between flange of the thrust bearing and the side of the adjacent thrust shoulder. If the clearance is insufficient (.002-007") the flanges may be dressed down. If the clearance is too great install a new thrust bearing.

CRANKSHAFT OIL SEAL, REPLACE

Six-Cylinder Engines

Locate the seals and gaskets carefully before the rear main bearing cap is installed, Fig. 33. To replace the upper seal, it is necessary to remove the flywheel.

V8 Engines

A braided oil seal is pressed into the upper and lower grooves behind the rear main bearing. Directly in front of this seal is an oil slinger which deflects the oil back into the oil pan. Should the lower half of the seal become damaged during servicing, replacement can be made as follows:

With the bearing cap and lower bearing half removed, install a new seal so that both ends protrude above the cap. Tap the seal down into position and roll it snugly in its groove with a smooth rounded tool. Then cut off the protruding ends of the seal with a sharp knife or razor blade.

OIL PUMP REPAIRS

Six-Cylinder Engines

External Mounting Type—To remove the pump, first remove the distributor cap and rotate the engine until the distributor rotor is in firing position for No. 1 cylinder. Keep the engine in this position while the pump is off. The pump may then be removed from the engine.

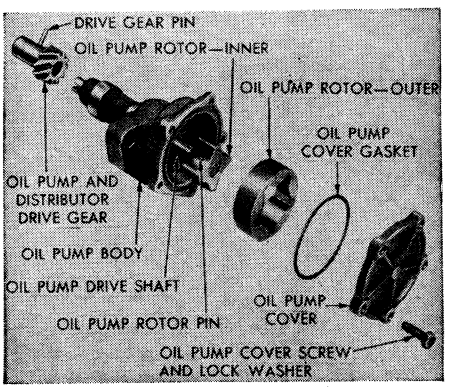

Fig. 34 Oil pump on six-cylinder engines

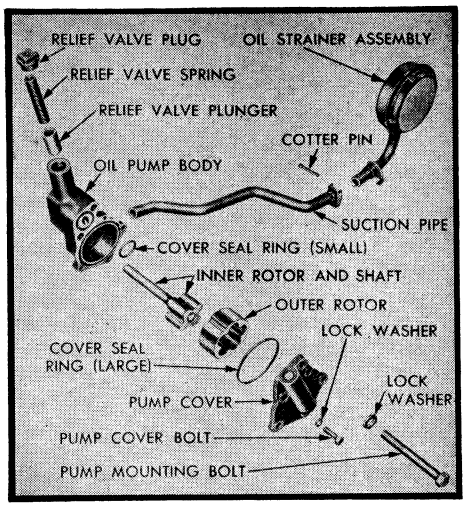

Fig. 35 Oil pump. Typical of all V8 engines

To disassemble the pump, Fig. 34, remove the cover and gasket. Hold a hand over the cover opening and with the pump upside down, turn the shaft until the outer rotor slips out. Drive out the pin securing the drive gear to the shaft, press the shaft out of the gear and slide the shaft and inner rotor out of the body.

Before installing the pump, see whether the distributor rotor is in No. 1 firing position. Then after installing the pump, check and set the ignition timing.

Internal Mounted Type—Remove the oil pan to reach the oil pump. Unfasten the pump from the engine and service it in same manner as the externally-mounted pump.

V8 Engines

After removing the pump from the engine it should be disassembled, cleaned and inspected for wear or damage, Fig. 35.

1. Remove the cotter pin holding the oil strainer to the oil suction pipe. Then remove the pipe from the pump body.
2. Remove the pump cover and discard the oil seal ring.
3. Remove pump rotor and shaft and lift out rotor body.
4. Remove oil pressure relief valve plug and lift out the spring and plunger.
5. Wash all parts in cleaning solvent and inspect carefully for damage or wear.
6. The mating face of the oil pump cover should be smooth. If it is scratched or grooved, the cover should be replaced with a new one.
7. Check for excessive cover-to-rotor wear by laying a straight edge across the cover surface. If a .0015" feeler gauge can be inserted between cover and straight edge, the cover should be discarded and a new one installed.
8. Measure the diameter and thickness of the rotor body with a micrometer. If the rotor body measures less than .998" and the diameter less than 2.244", install a new rotor body.
9. Measure the thickness of the pump rotor. If it measures less than .998", a new rotor should be installed.
10. Slide rotor body and rotor into pump

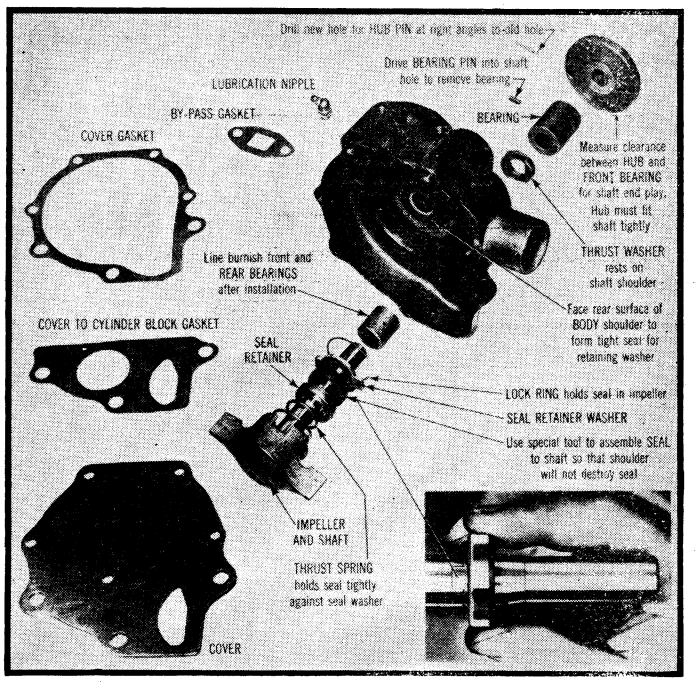

Fig. 36 Bushing type water pump. Light-duty six-cylinder engines

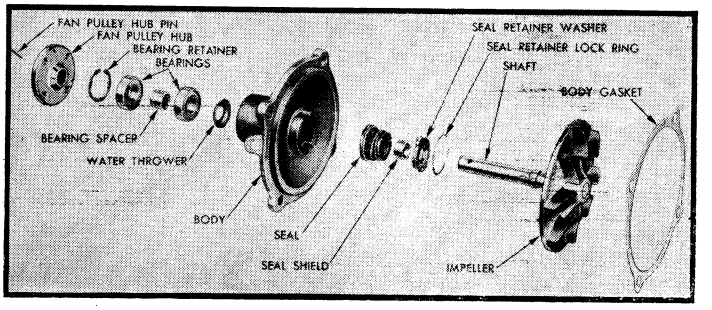

Fig. 39 Water pump with removable bearings. Typical of all V8 engines

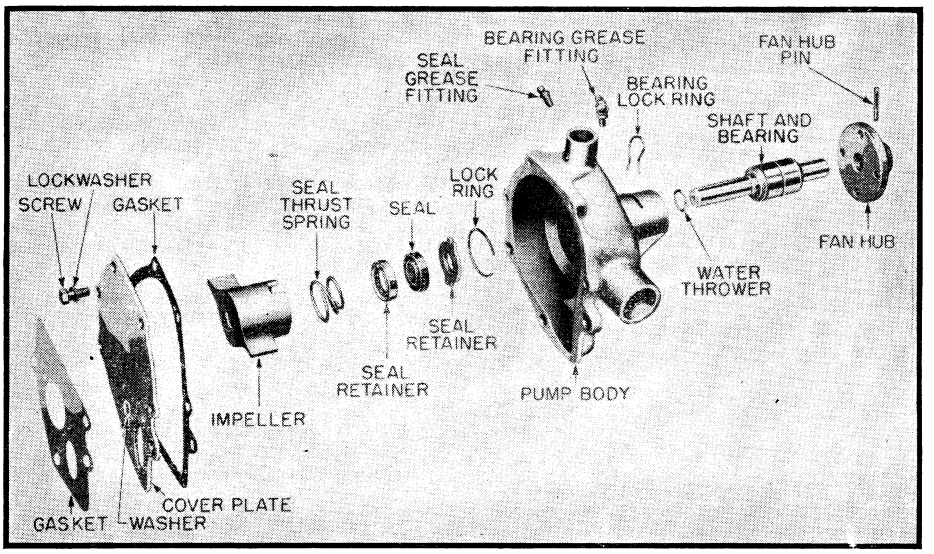

Fig. 37 Water pump with integral bearing and shaft. Six-cylinder engines

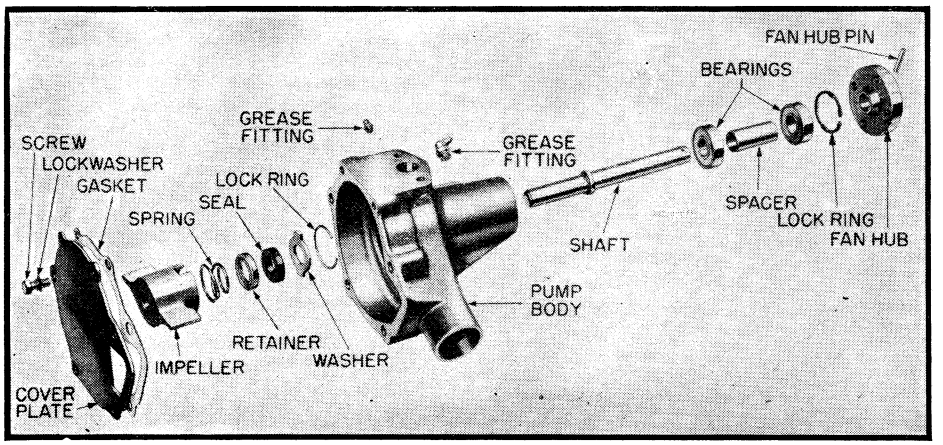

Fig. 38 Water pump with removable bearings. Six-cylinder engines

body and then place a straight edge across the face of the pump body between the bolt holes. If a feeler gauge of more than .004" can be inserted between the rotors and straight edge, install a new pump body.

11. Remove the pump rotor and shaft, leaving rotor body in pump cavity. Press rotor body to one side with the fingers and measure the clearance between rotor and pump bodies. If it is more than .012", install a new pump body.
12. Check the clearance between the pump rotor and rotor body. If the measurement is more than .010", install a new pump rotor and rotor body.
13. Check the oil pump relief valve plunger for scoring and free operation in its bore. If the plunger is scored, install a new one.
14. When assembling the pump, be sure to use a new oil seal ring between the cover and body. Tighten cover bolts to a torque of 10 lbs. ft.
15. Prime the pump. Then place a new oil seal ring in the pump mounting face. Install oil pump and strainer and fasten the pump in position, tightening the bolts with a torque wrench to 35 lbs. ft.

WATER PUMP REPAIRS

All Engines

Figs. 36 to 39 illustrate the various type water pumps used on these engines. When servicing a pump be sure to install the seal parts correctly.

Inspect the face of the pump body against which the sealing washer turns. This surface should be smooth and free of scores. Reface with a suitable tool if necessary. Discard the pump impeller if it is corroded or loose on the shaft.

IGNITION TIMING

All Engines

For initial or basic timing, crank the engine to bring No. 1 piston up on its compression stroke and stop when the ignition timing mark is opposite the in-