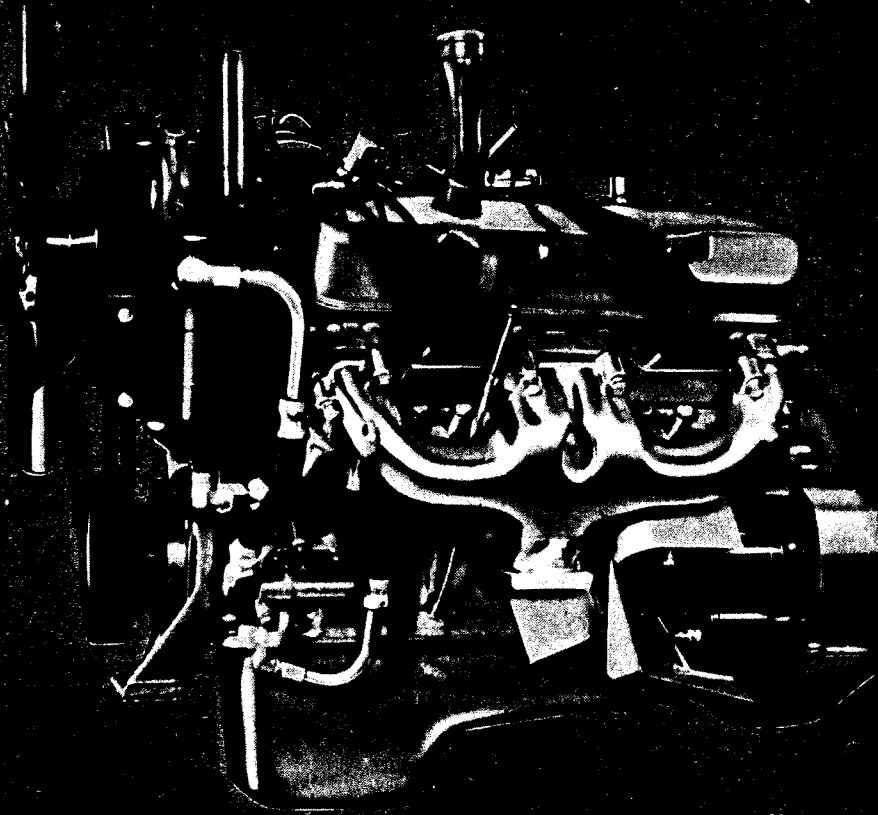


Chrysler



OPERATING MANUAL

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IMPORTANT

For your convenience, fill in the information requested below from your own engine. It will then be readily available when needed for identification purposes, should the replacement of parts ever become necessary.

Model

Type

Serial Number

SD & T — 5-63-10M
Litho in U. S. A.

81-770-7550

FOREWARD

This Operator's Manual is published as a guide and reference to assist the Owner in obtaining from the new Chrysler Industrial Engines, Models H, HB, HC, HC1, and HT, the power, performance and dependability built into all the Industrial Engines.

In order to obtain every advantage of these qualities over a period of time, it is suggested that you read the operating instructions completely, and handle your New Chrysler Industrial Engine accordingly.

The Authorized Chrysler Industrial Engine Dealers throughout the country will give you the best of service and attention in keeping your Industrial Engine at the peak of operating efficiency. These instructions if followed, will insure dependable operation, performance and complete satisfaction.

MODIFICATIONS

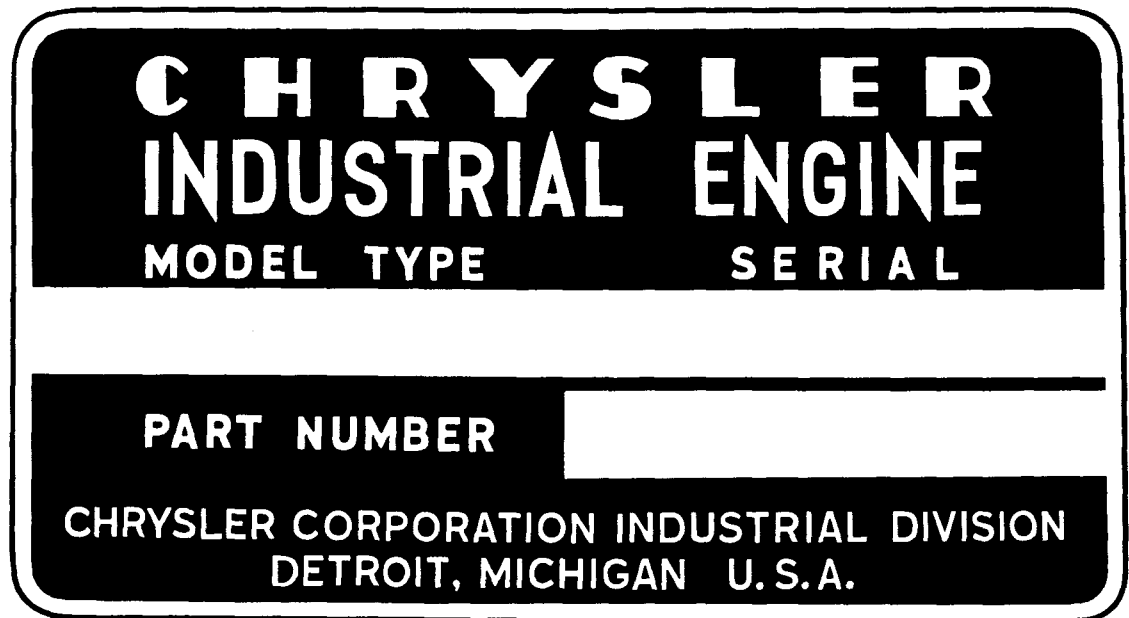
There may be slight modifications in the design of the Engine as dictated by field experience or a desire to improve the engine; or changes of material may become necessary due to the inability to procure those originally specified. If such changes become obvious, then wherever possible, parts or assemblies will be made interchangeable with the original design.

ILLUSTRATIONS

The illustrations and line drawings in this Operator's Manual are intended to show the owner various parts and constructions of the engine. In some instances the shapes or details of the parts illustrated may not exactly represent their actual appearance; however, they are being used to show the servicing methods or operation of the parts performing the same function.

IDENTIFICATION

A brass name plate is attached to the rear side of the left cylinder head (Figure 1) showing the model, type and serial number of the engine.



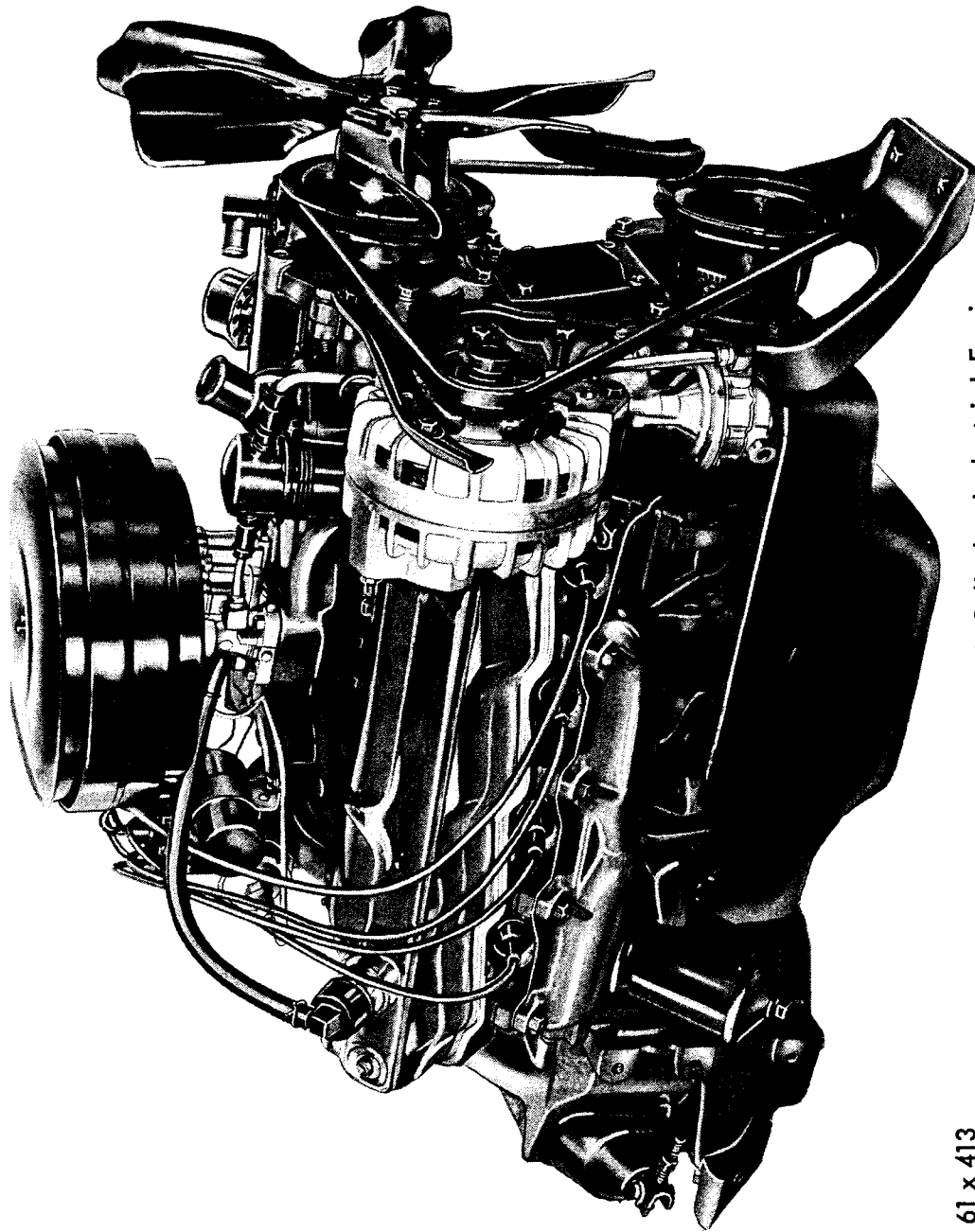
54x970A

Figure 1 — Engine Identification Name Plate

DESCRIPTION

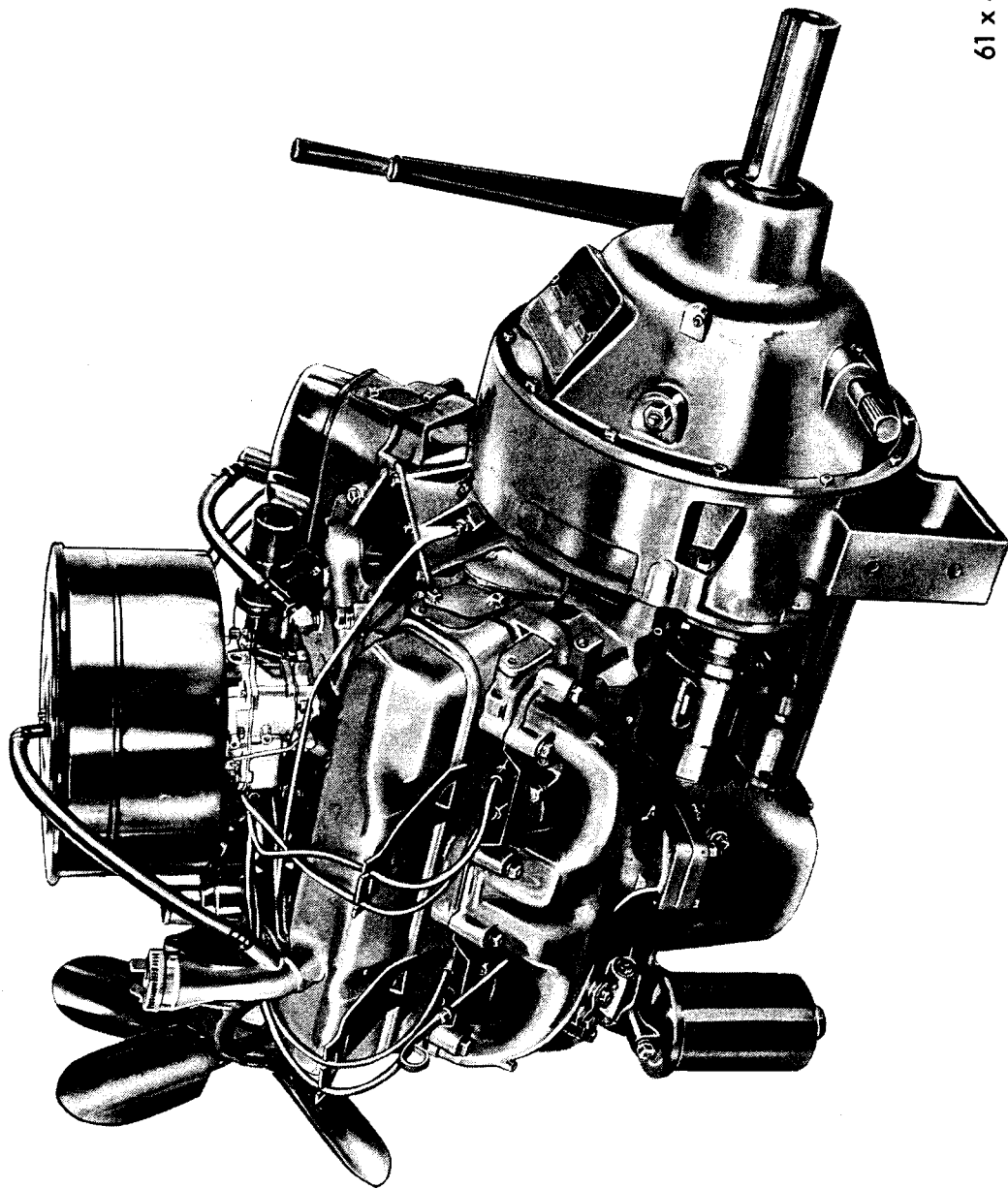
GENERAL DIFFERENCES AMONG MODELS

Chrysler 8-cylinder Industrial Engines, Models H-318, HB-318, HC-318, H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413 and HT-413, (Figures 2, 3 and 4) are supplied in various types for powering: Delivery trucks, Sweepers, Lift trucks, Navigation and Stand-By Pumps, Wind Machines, Mobile Air Conditioners, Crane Carriers, Hoisting Equipment, Welding Generators, Tow Tractors, Concrete Mixers, Orchard Sprayers and many other industrial applications.



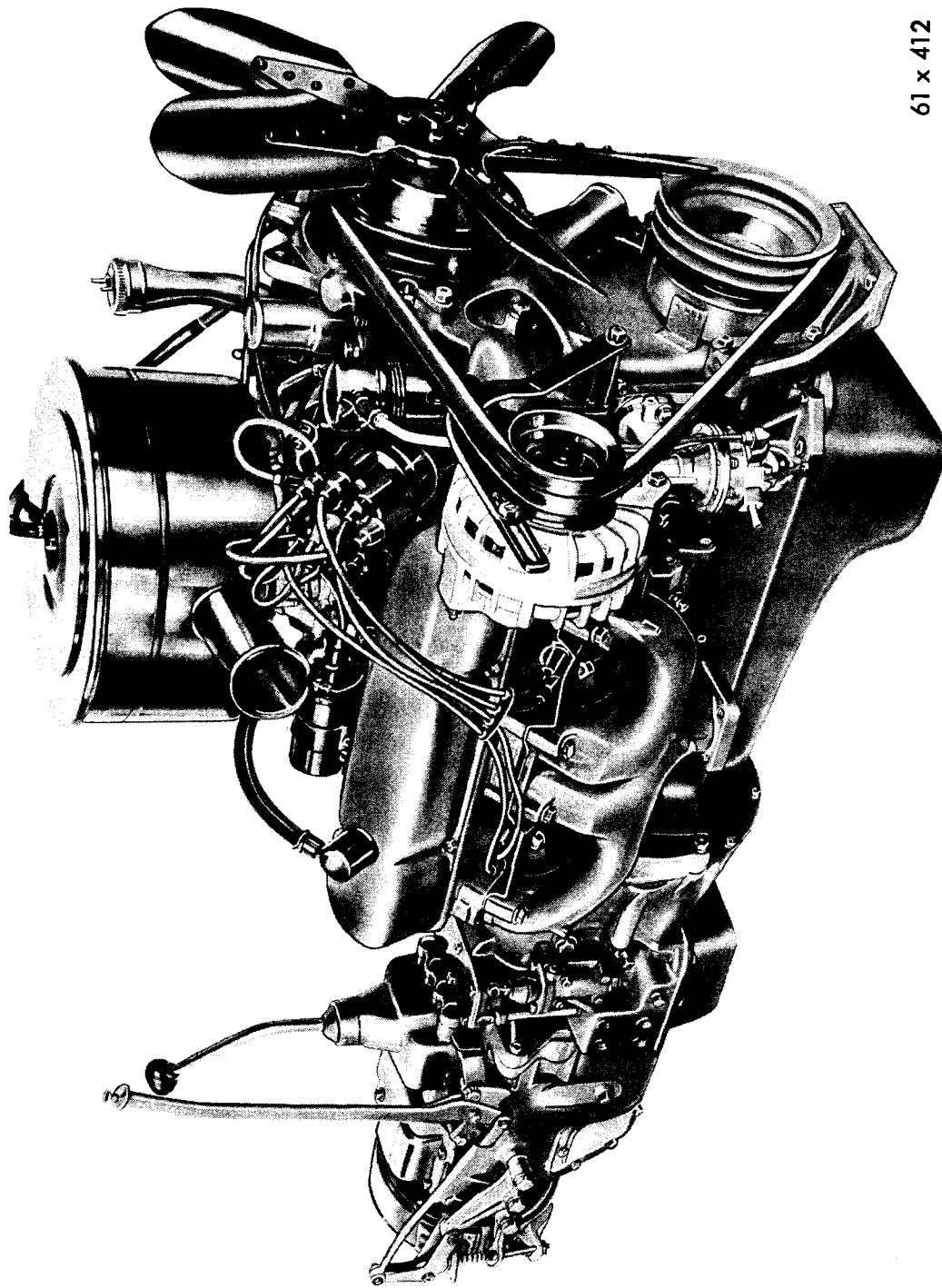
61 x 413

Figure 2 — Chrysler 8-Cylinder Industrial Engine
with Clutch Housing (Model H-318)



61 x 414

Figure 3 — Chrysler 8-Cylinder Industrial Engine Model H-361



61 x 412

Figure 4 — Chrysler Industrial Engine Model HT-361, HT-413
with Power Torque and 5-Speed Transmission

In order to identify the service parts requirements or where various accessories are required for different adaptations, such as the New Power Torque units; 3, 4 or 5-speed Transmissions, Power Take-off or Liquid Propane Gas Operation, a separate model and type number is designated for each engine, such as Model, H-318-101, H-361-103, HT-361-104, H-413-106, HT-413-107. This is done so that your engine can be identified in determining the service parts requirements or where additional accessories are required.

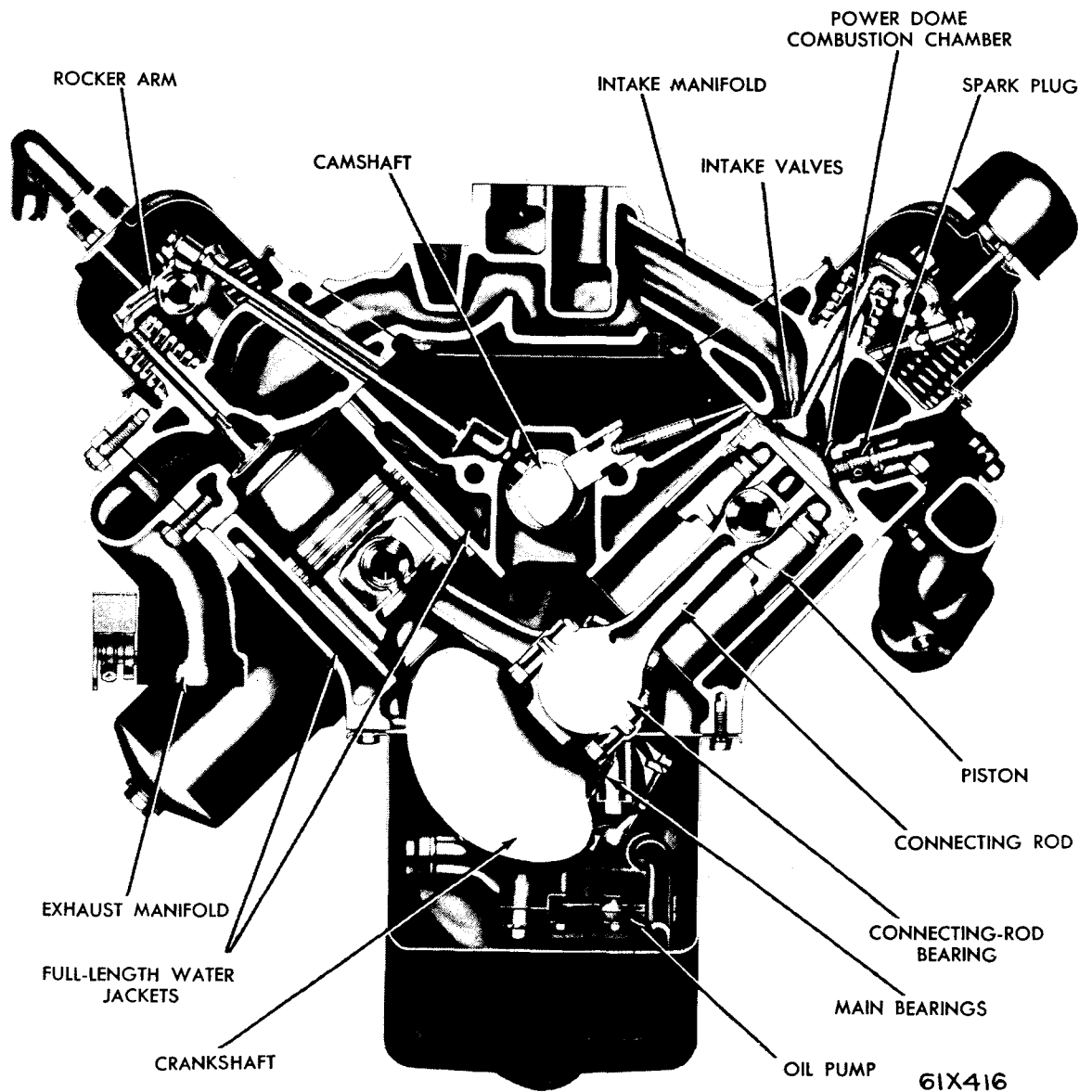


Figure 5 — Chrysler 8-Cylinder Industrial Engine
Models H-318, HB-318, HC-318 (Sectional View)

CONSTRUCTION

The new Chrysler Industrial Engines, as shown in Figures 5, 6 and 7 are V-type eight cylinder, four stroke cycle, internal combustion gasoline engines with valve-in-head poppet valves. The engines are pressure lubricated and liquid cooled. "H" indicates light duty operation. "HB"

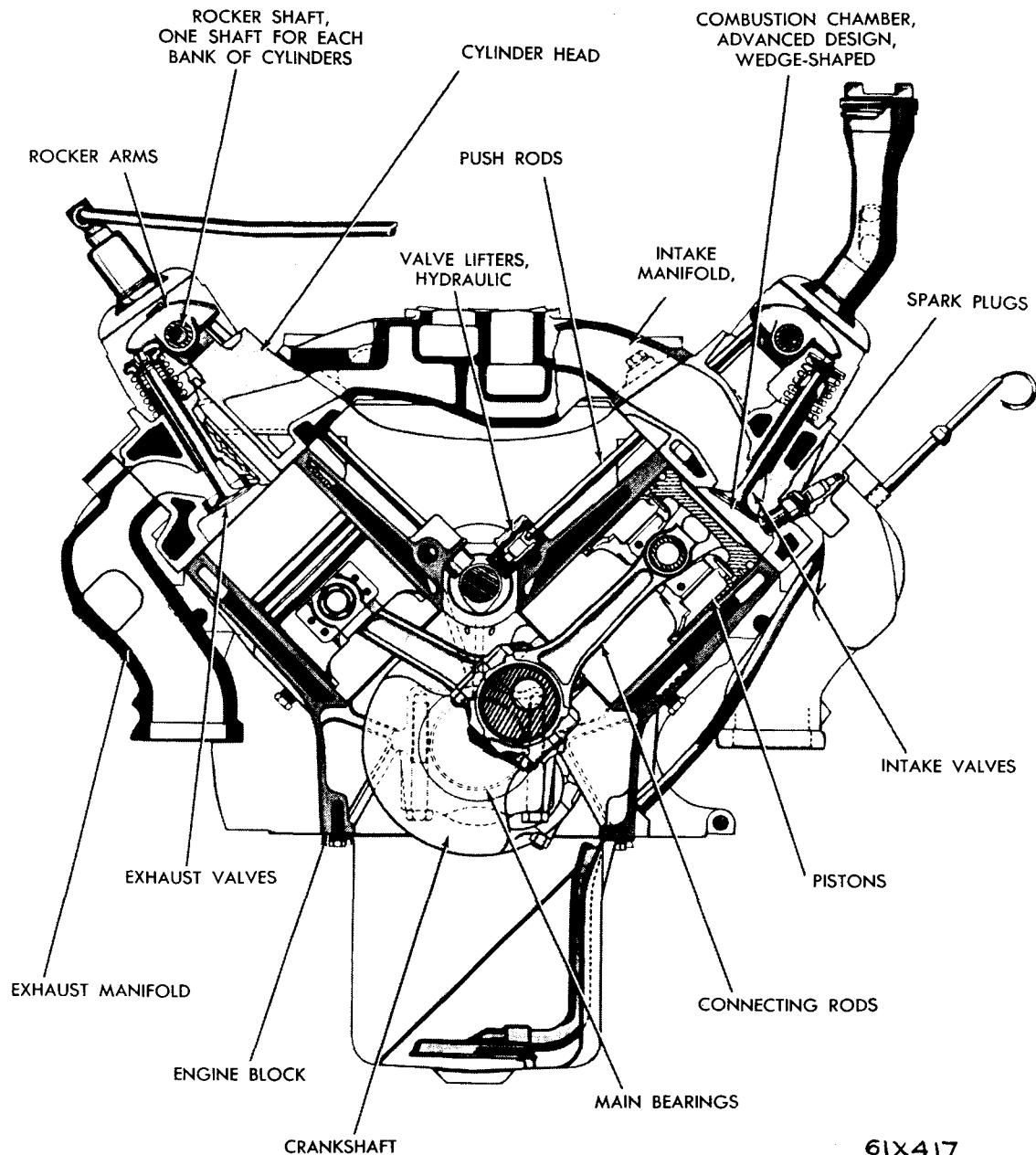
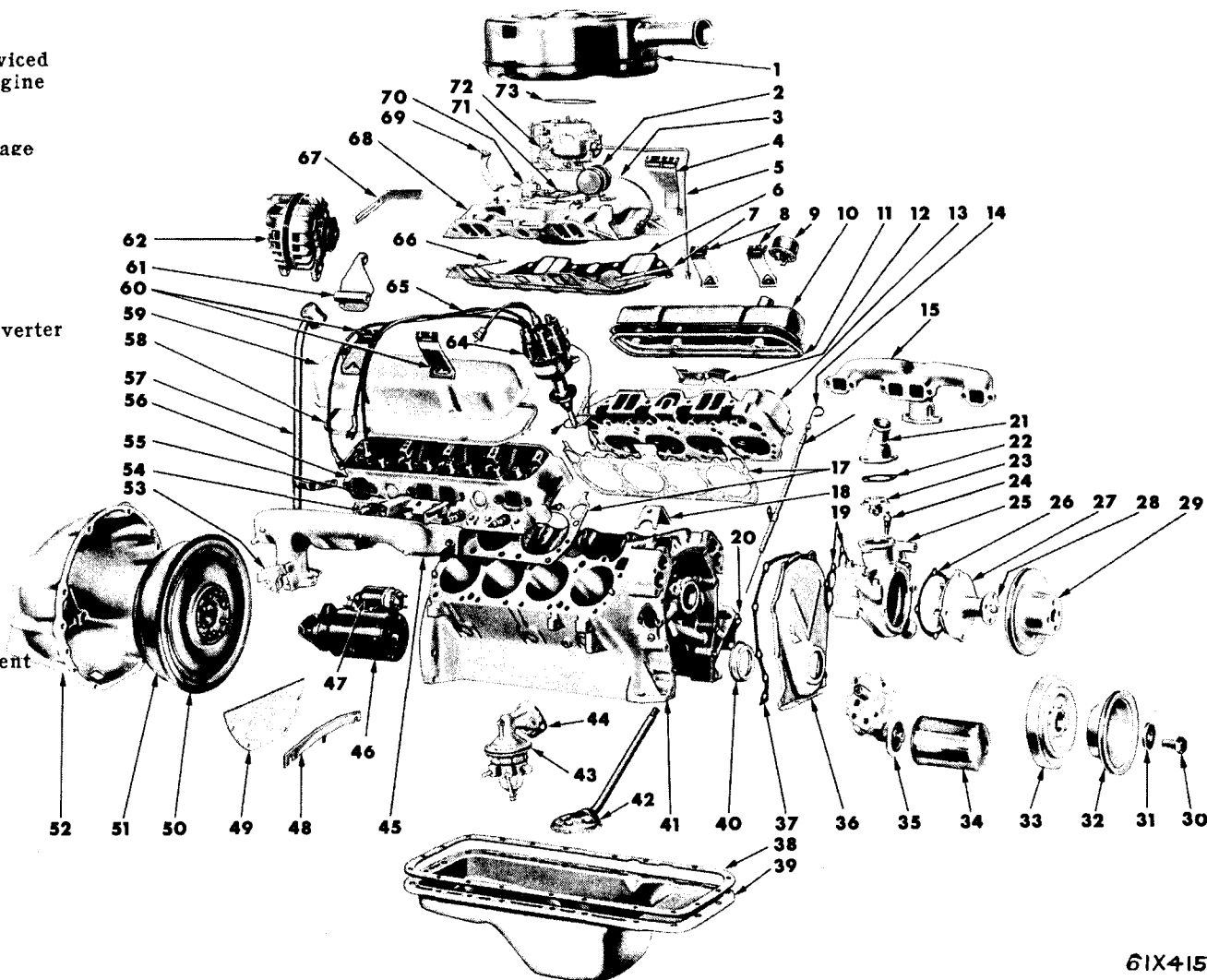


Figure 6 — Chrysler 8-Cylinder Industrial Engine Models
HT-361, HT-413 (Sectional View)

- | | |
|------------------|--|
| 1. Air Cleaner | 38. Gasket |
| 2. Coil | 39. Pan |
| 3. Tube | 40. Oil Seal |
| 4. Bracket | 41. Block (Serviced
in short engine
9-01-24) |
| 5. Tube | 42. Strainer |
| 6. Gasket | 43. Pump Package |
| 7. Reinforcement | 44. Gasket |
| 8. Bracket | 45. Manifold |
| 9. Air Cleaner | 46. Starter |
| 10. Cover | 47. Solenoid |
| 11. Gasket | 48. Support |
| 12. Shield | 49. Cover |
| 13. Head | 50. Gear |
| 14. Indicator | 51. Torque Converter |
| 15. Manifold | 52. Housing |
| 16. Tube | 53. Shield |
| 17. Gasket | 54. Spark Plug |
| 18. Clamp | 55. Shield |
| 19. Gasket | 56. Head |
| 20. Gasket | 57. Pipe |
| 21. Elbow | 58. Gasket |
| 22. Gasket | 59. Cover |
| 23. Thermostat | 60. Bracket |
| 24. Fitting | 61. Bracket |
| 25. Housing | 62. Alternator |
| 26. Gasket | 63. Retainer |
| 27. Pump Package | 64. Distributor |
| 28. Hub | 65. Cable Set |
| 29. Pulley | 66. Reinforcement |
| 30. Screw | 67. Strap |
| 31. Washer | 68. Manifold |
| 32. Pulley | 69. Bracket |
| 33. Damper | 70. Choke |
| 34. Oil Filter | 71. Gasket |
| 35. Pump | 72. Carburetor |
| 36. Cover | 73. Gasket |
| 37. Gasket | |



6IX415

Figure 7 — Chrysler 8-Cylinder Industrial Engine

indicates medium duty operation. "HC" indicates high compression medium duty operation. "HT" indicates heavy duty operation. The numbers designate the cubic inch displacement of the engine.

The cast iron engine block which supports the pistons, tappets and crankshaft is short, low and rugged. Full length water jackets surround the equally-spaced cylinders. The "over-square" bore and stroke design contribute to the longevity and operating economy of the engine.

The camshaft is driven by a silent timing chain on Models H-318, HC-318, H-361, HB-361, HC-361, H-413, HB-413, HC-413, HC1-413; and by a roller chain on Model HB-318; and by gears on Models HT-361, and HT-413. The camshaft provides adequate valve overlap for deep breathing past the silchrome intake valves. Model HB-318 has stellite faced exhaust valves. On Models HT-361 and HT-413 the exhaust valves are stellite faced sodium filled. On Models HB-361, HC-361, HB-413 and HC-413 the exhaust valves are stellite faced with solid stems. Models HB-361, HC-361, HT-361, HB-413, HC-413 and HT-413 have replaceable exhaust valve seats.

The valves are operated by rocker arms on single rocker shafts on each cylinder head. All HT model engines are equipped with positive exhaust valve rotators .

Removable valve stem guides are used on HT-361 and HT-413 models.

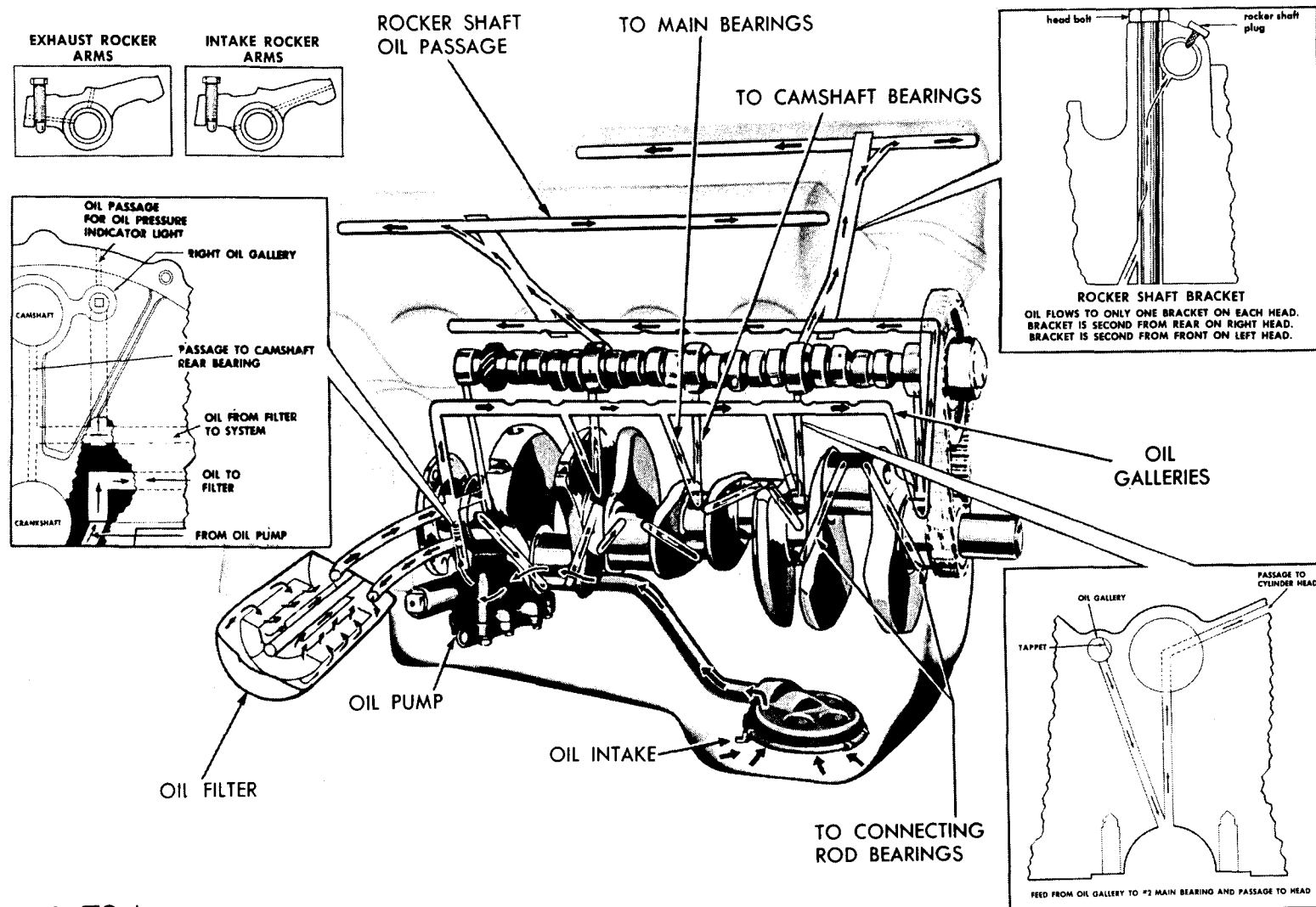
Hydraulic tappets are used on Models HB-318, H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413, HT-413, and require no adjustment. Mechanical tappets are used on Models H-318 and HC-318. The valve clearance adjustments are made at the rocker arms.

All connecting rod bearings and the five main bearings have precision removable type bearing shells. Models H-318, HC-318, H-361, HB-361, HC-361, H-413, HC-413, HC1-413 use steel backed babbitt rod and main bearing inserts. Models HB-318, HT-361, and HT-413 use tri-metal connecting rod and main bearing inserts with a hardened shot peened crankshaft. The five camshaft bearings are also of the removable type.

LUBRICANTS

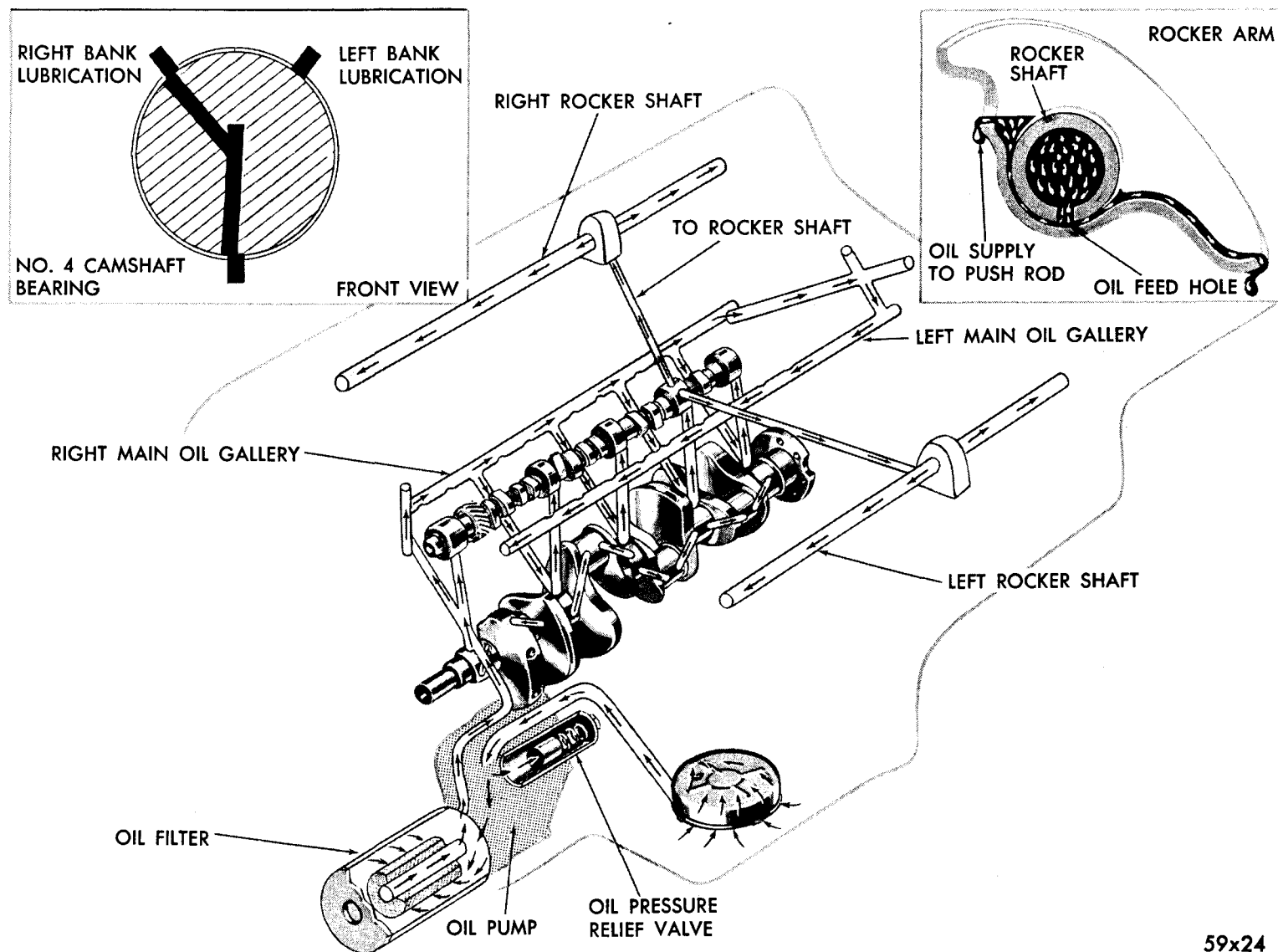
Engine lubricating oils perform many various functions, under very trying conditions in the modern high performance industrial engine.

The primary function of the oil is to lubricate all parts of the engine to reduce friction. Many different types of friction are involved. The pistons moving up and down within the cylinders have a sliding friction.



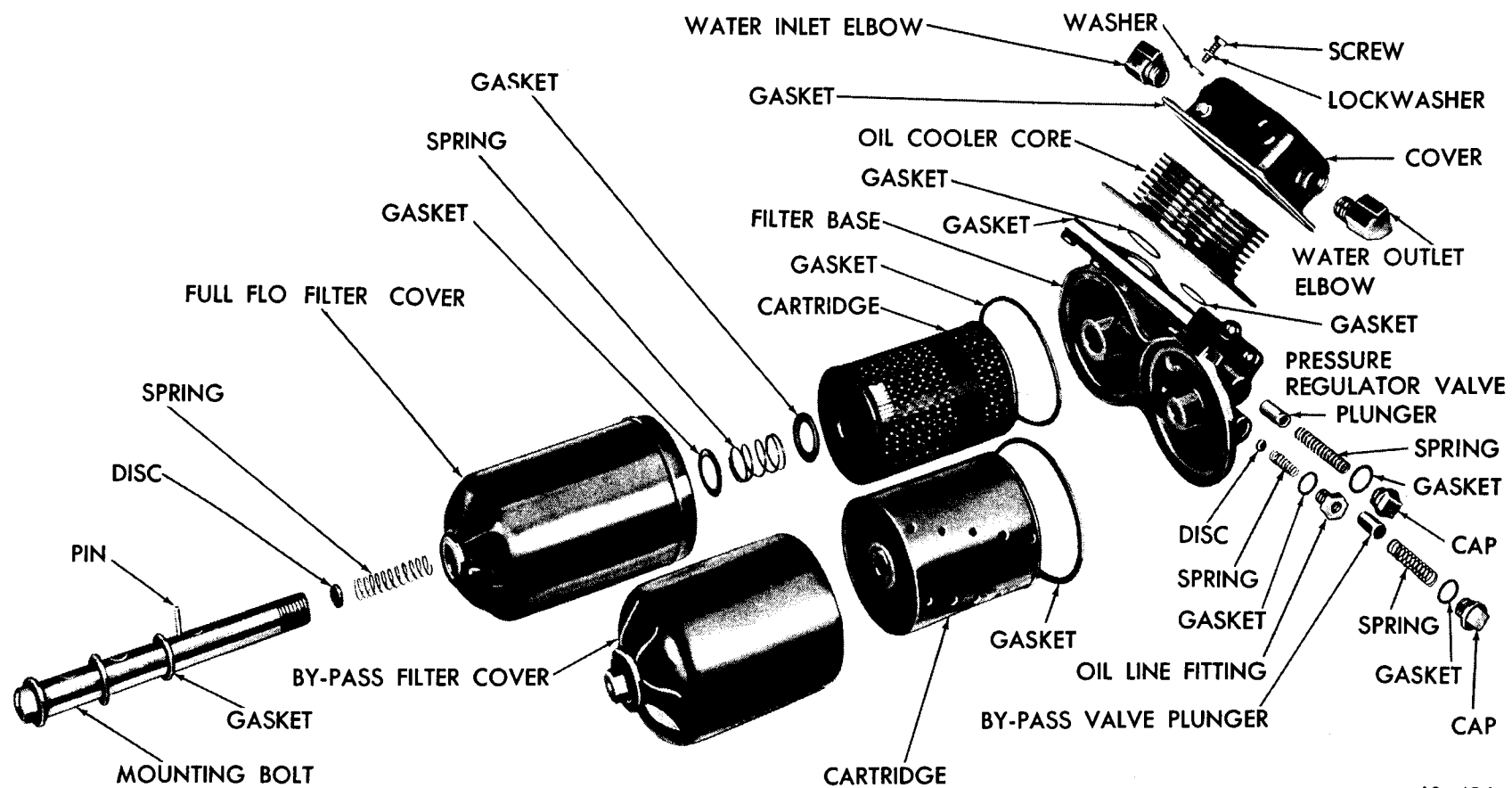
59x79 A

Figure 8 — Engine Oiling System Models H-318, HB-318, HC-318



59x24

Figure 9 — Engine Oiling System Models H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413, and HT-413



60x426

Figure 10 — Dual Filter and Oil Cooler Assembly

The piston pins and connecting rod bearings must withstand a direct contact type of friction. There is also a rolling type friction, between gears and between roller bearings. The tolerances or clearances between these parts varies. In many places in the engine the oil must separate parts which are less than one thousandth of an inch apart. Yet the oil must have sufficient film strength to withstand continuous pressure and changes in temperature without breaking down or permitting direct contact between the moving parts.

In performing its lubricating function, the engine oil also acts as a coolant to transfer a portion of the heat of combustion from the pistons and valves to the cooling system.

The engine oil is also a cleaning agent, picking up small particles of foreign matter, condensation, etc. which can be carried to the oil filter where the material is trapped and held out of circulation.

Engine oil maintains a seal, especially between the piston rings and the cylinder walls. The two top piston rings are called compression rings because their primary function is to hold the compression pressures within the combustion chambers. In acting as a sealer, the engine oil lends assistance to the piston rings.

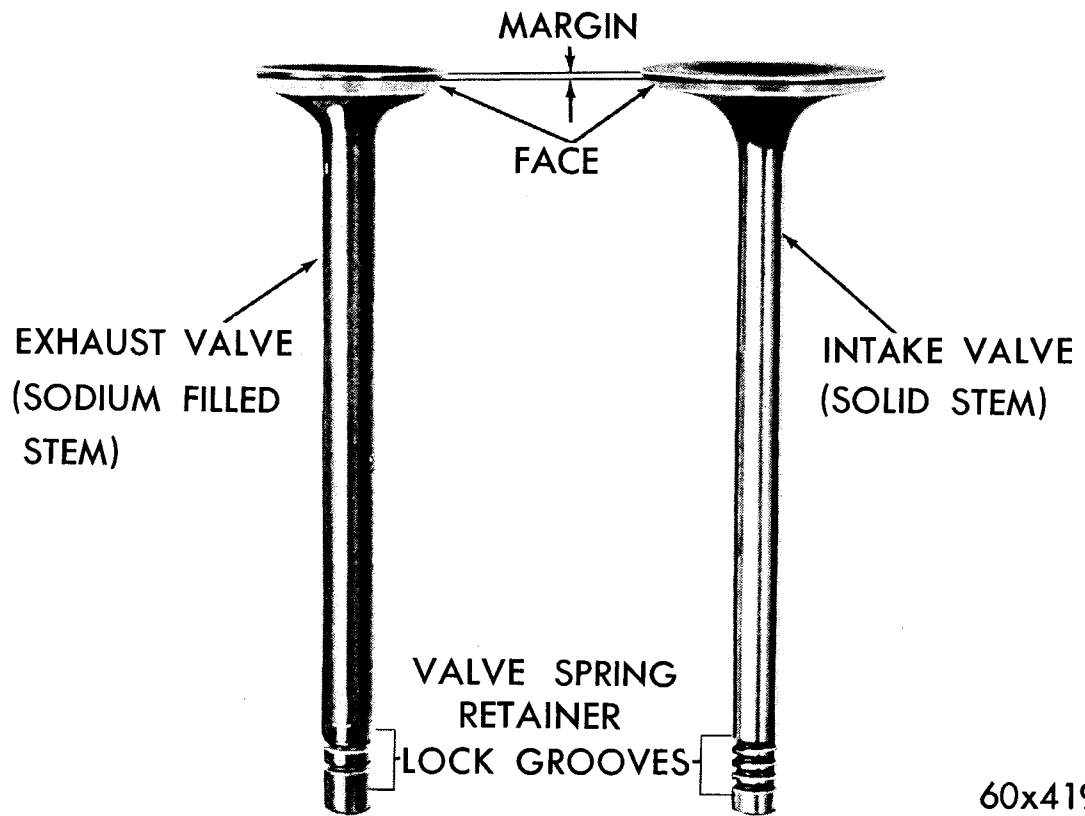
LUBRICATION

The engine oiling system of the H, HB, HC, and HT-318 engines consists of a rotor type oil pump and full flow oil filter. Oil is forced under pressure by the oil pump to a series of oil passages in the engine as shown in Figure 8.

The standard engine oiling system of the H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413, HT-413 engines consists of an externally mounted rotor type oil pump and a full flow filter. Oil is forced under pressure by the oil pump to a series of oil passages in the engine as shown in Figure 9. Some heavy duty HT-361 and HT-413 engine applications require dual oil filtration, where a full flow and by-pass type filter is employed in conjunction with an oil cooler (Fig. 10).

EXHAUST VALVES

One of the outstanding features of the Chrysler 8-cylinder Industrial Engines is sodium-cooled exhaust valves which are available as standard equipment on Models HT-361 and HT-413 only. They are specified for heavy duty operation (Fig. 11). The sodium-cooled valve stem is made hollow and then partially filled with pure metallic sodium, which liquefies at 207°F. In liquid form, the sodium moves up and down with the mo-



60x419

Figure 11 — Intake and Sodium Filled Exhaust Valves

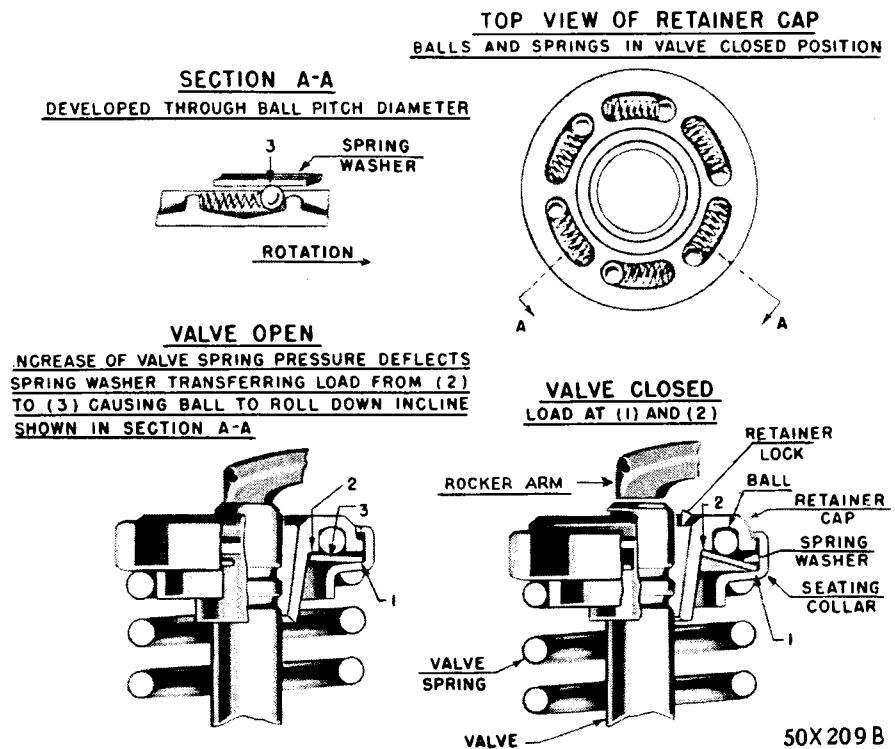


Figure 12 — Exhaust Valve Spring Retainer Assembly Rotators (Schematic View)

tion of the valve in operation and helps to transfer heat from the valve head to the engine cooling system. The engines equipped with sodium-cooled valves can be identified by a decal attached to the cylinder head cover near the engine identification name plate.

EXHAUST VALVE ROTATORS

On all "HT" Models only, Industrial Engines are equipped with exhaust valve rotators to provide positive rotation of the exhaust valves each time they open. Their purpose is to prolong the life of exhaust valves. (Fig. 12).

The rotators are installed on the valve stems in place of the conventional valve spring retainers, changing from four to two bead valve locks.

When rotators are used on the exhaust valves, special valve springs are used, which are not interchangeable with intake valve springs.

ADJUSTING VALVE TAPPETS

The valve tappets on Models H-318 and HC-318 should be adjusted with the engine running at idle at normal operating temperature. The valve tappet screws are of the self locking type, without locknuts. The screw should have a minimum of 3 foot pounds torque as it is being turned, and if less than this, replace the adjustment screw and, if necessary the rocker arm. Adjust the valve tappets to Intake .012 inch; Exhaust .022 inch. It is important that the proper clearance is maintained to insure satisfactory engine performance.

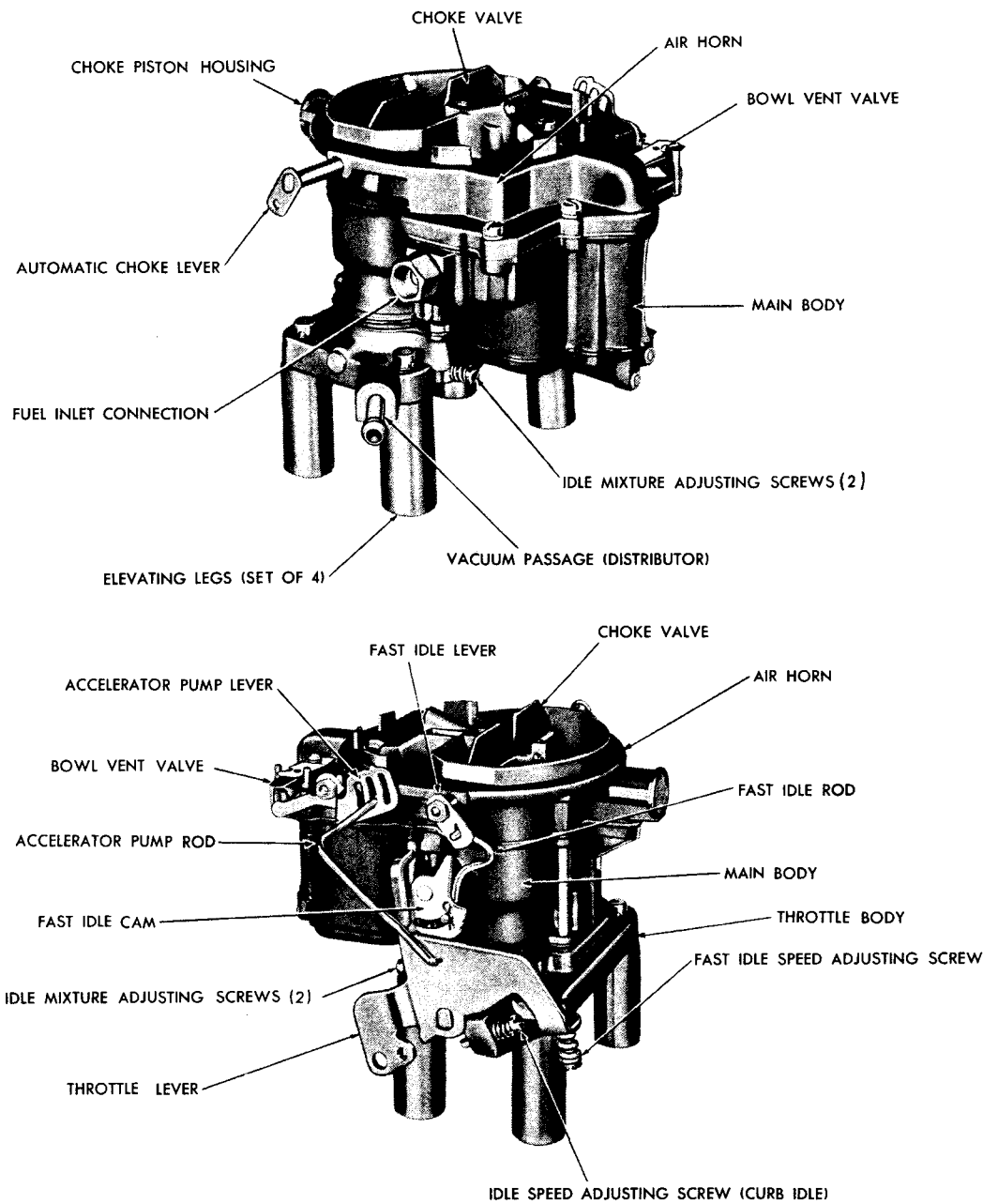
FUEL SYSTEM

The fuel system includes the fuel lines, fuel pump and filter, carburetor, intake manifold and throttle control. Fuel from the tank passes through the filter into the fuel pump, which is driven by an eccentric on the front end of the camshaft. The fuel pump forces fuel into the carburetor where it is atomized and mixed with air and drawn through the manifold and valves into the combustion chamber.

The Stromberg Carburetors (Figs. 13 and 14) Series WW3-190, WW3-194, WW3-185 and AAVP-2 are a dual throat downdraft type with each throat having its own idle system (with adjustable needle), main metering system and throttle valve. The idle system and main metering systems are supplemented by the float system, the accelerating system and the power system. The function of each system is described briefly as follows:

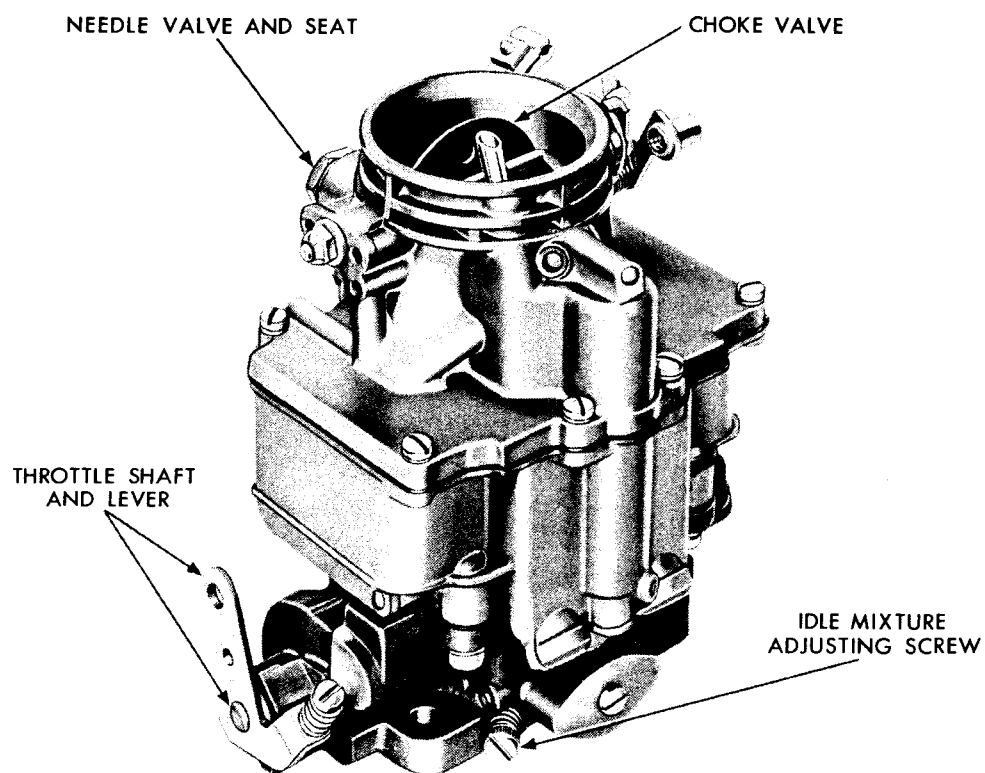
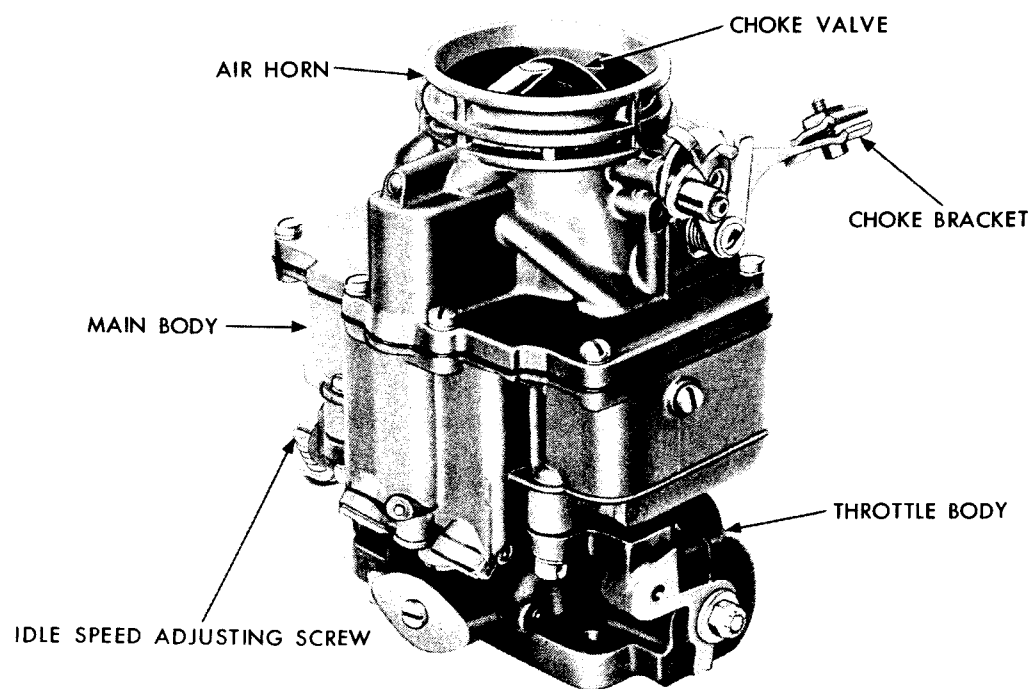
THE FLOAT SYSTEM

The function of the float system is to maintain a constant level of



60x331A

Figure 13 — Stromberg Carburetor Assembly WW3-190, WW3-194



54x62

Figure 14 — Stromberg Carburetor AAVP-2

fuel in the float chambers at all times and under all normal conditions of operation. Fuel enters the carburetor at the fuel inlet, flows through the float needle valve and seat and into the float chambers.

When the fuel reaches a given level, the floats shut off the fuel supply at the needle valve. The float chambers are vented internally by a vent tube which connects the float chambers with the air horn.

THE IDLE SYSTEM

With the throttle valves closed, and the engine running at slow idle speed, fuel from the float chambers is metered into the idle tubes through an orifice at the base of each idle tube. The air taken in through the idle air bleed holes mixes with the fuel at the top of the idle tubes.

The mixture of air and fuel flows down the channels where it is mixed with additional air entering through the secondary idle air bleeds. The mixture is discharged at the lower idle discharge holes. The quantity of fuel discharged is controlled by adjustable idle needle valves. As the throttle valves are opened slightly, the air-fuel mixture is also discharged from the upper idle discharge holes to supply the additional fuel required for increased engine speed.

MAIN METERING SYSTEM

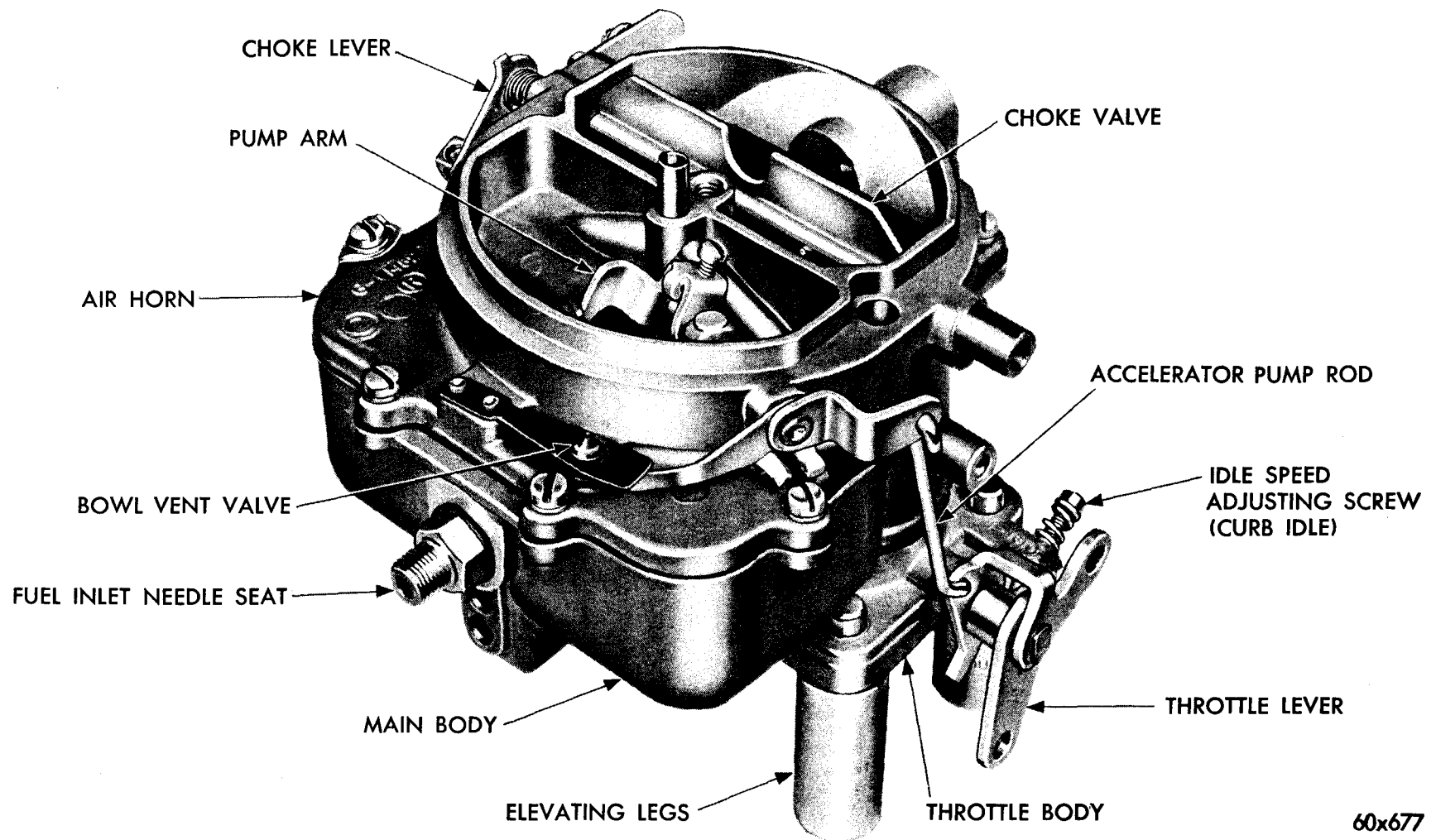
The main metering system controls the flow of fuel during the intermediate or part throttle range of operation. With the throttle valves in a partially open position, fuel flows from the float chambers through the main metering jets and enters the main discharge jets where it is mixed with air taken in through the high speed air bleeders.

This mixture of air and fuel is then discharged into the air stream through the auxiliary venturi tubes. The main body and main discharge jets are so designed that should vapor bubbles form in the fuel in the main discharge system, due to high temperatures, the vapor bubbles will collect in the outside channels surrounding the main discharge jets, rise and vaporize in the domes of the high speed bleeders, thus preventing "percolation".

POWER SYSTEM

The power system is incorporated into the carburetor to provide a richer mixture for maximum power and high speed operation. The extra fuel for power is supplied by a vacuum controlled power piston which automatically operates the power by-pass jet in accordance with throttle opening.

Intake manifold vacuum is maintained above the vacuum piston through a vacuum channel which leads to the manifold flange of the



60x677

Figure 15 — Ball and Ball Carburetor Assembly BBD-2905 SA

carburetor. During partial throttle operation, the vacuum above the vacuum piston is sufficient to overrule the compression spring and hold the piston in the "UP" position.

When the throttle valves are opened to the point where the manifold vacuum drops to approximately four to five inches of mercury, the compression spring then moves the piston "DOWN" to open the power bypass jet and meter additional fuel into the main metering system.

ACCELERATING SYSTEM

To insure a smooth uninterrupted flow of power for acceleration, additional fuel must be metered into the engine. This is accomplished through the use of an accelerating pump which is operated by vacuum.

As the throttle valves are opened, the accelerating pump piston is moved "DOWN" either by a pump lever or by a drop in vacuum above the piston to close the inlet ball check valve and force a metered quantity of extra fuel through the outlet ball check valve and pump discharge nozzle into the air stream.

With the return of the accelerating pump lever to the released position or the return to normal engine vacuum, the outlet ball check valve "CLOSES" while the inlet ball check valve "REOPENS", thus permitting fuel from the float chamber to enter and refill the accelerating pump cylinder.

NOTE: The AAVP-2 carburetor is supplied by the carburetor manufacturer with a hollow screw in the mouth of the vacuum channel. When the carburetor is used with a governor this screw must be in the passage to block off the connection between the throat and the vacuum passage. When not used with a governor this screw must be removed.

The BBD Series Ball and Ball Carburetor, BBD-2905SA and BBD-2923SA are of the dual throat downdraft type and incorporates a manual choke. (Fig. 15). Each throat has its own throttle valve, idle and main metering systems which are supplemented by the float, accelerating and power system. The carburetor is used in conjunction with a mechanical governor. The operation of the float, low speed, high speed and accelerator pump systems are described briefly:

FLOAT SYSTEM

The float system maintains a fuel supply at the proper level for normal operating conditions. The fuel level is kept at a minimum to limit fuel vaporization and to aid in warm engine starting. It is important that floats be properly adjusted, and needle valve assembly is in good condi-

tion. Equally important is a good seal between the air horn and main body. A poor gasket at this point causes leakage resulting in wasting the fuel and might allow the entrance of dirt or other foreign material, which would result in poor performance.

LOW SPEED SYSTEM

During engine idle or part throttle operation, fuel is supplied to the engine through the low speed system. Fuel enters the main metering jet and is metered through the idle orifice tube where it mixes with air drawn through the idle air bleed. The idle restriction breaks up the fuel as it mixes with air drawn through the idle air bleed. This provides an air-fuel mixture at the idle port and idle adjustment screw port.

It is important that the idle air bleed, idle orifice tube, idle restriction, idle passage, idle port, and idle adjustment screw port are kept clean. Any clogging will result in poor low speed operation. Air leakage through the gaskets will also cause poor engine idling or low speed operation.

HIGH SPEED SYSTEM

During part or full throttle operation, fuel is supplied to the engine through the high speed system.

When the engine is under a heavy load, suddenly accelerated, or operated at very high engine speeds, the step-up system supplies additional fuel through the diffuser bar discharge ports. Fuel flow through the fuel passage of the main metering jet is controlled by the movement of the step-up rod which in turn is moved by a spring and a vacuum-controlled piston. A vacuum passage to the intake manifold is provided for by a drilled passage in the carburetor body and throttle body, and a slotted flange gasket.

Under normal operating conditions, manifold vacuum exerts a strong pull on the vacuum piston. This holds the piston down keeping the step up rod in the orifice of the main metering jet. Fuel then flows around the rod, through the jet, and through the diffuser bar discharge ports.

When manifold vacuum falls off, due to a heavy load, sudden acceleration or very high engine speed, the spring moves the piston up, moving the step up rod out of the main metering jet orifice. Additional fuel is then supplied to the engine.

Air is drawn through the high speed air bleed and mixes with the fuel surrounding the main vent tube. The mixture is then drawn from the diffuser discharge ports. It is important that the vent tube is clean. A clogged tube may cause excessively rich mixtures. Leakage of air at the gaskets will decrease or destroy the vacuum and the step-up piston will remain up resulting in excessive fuel consumption.

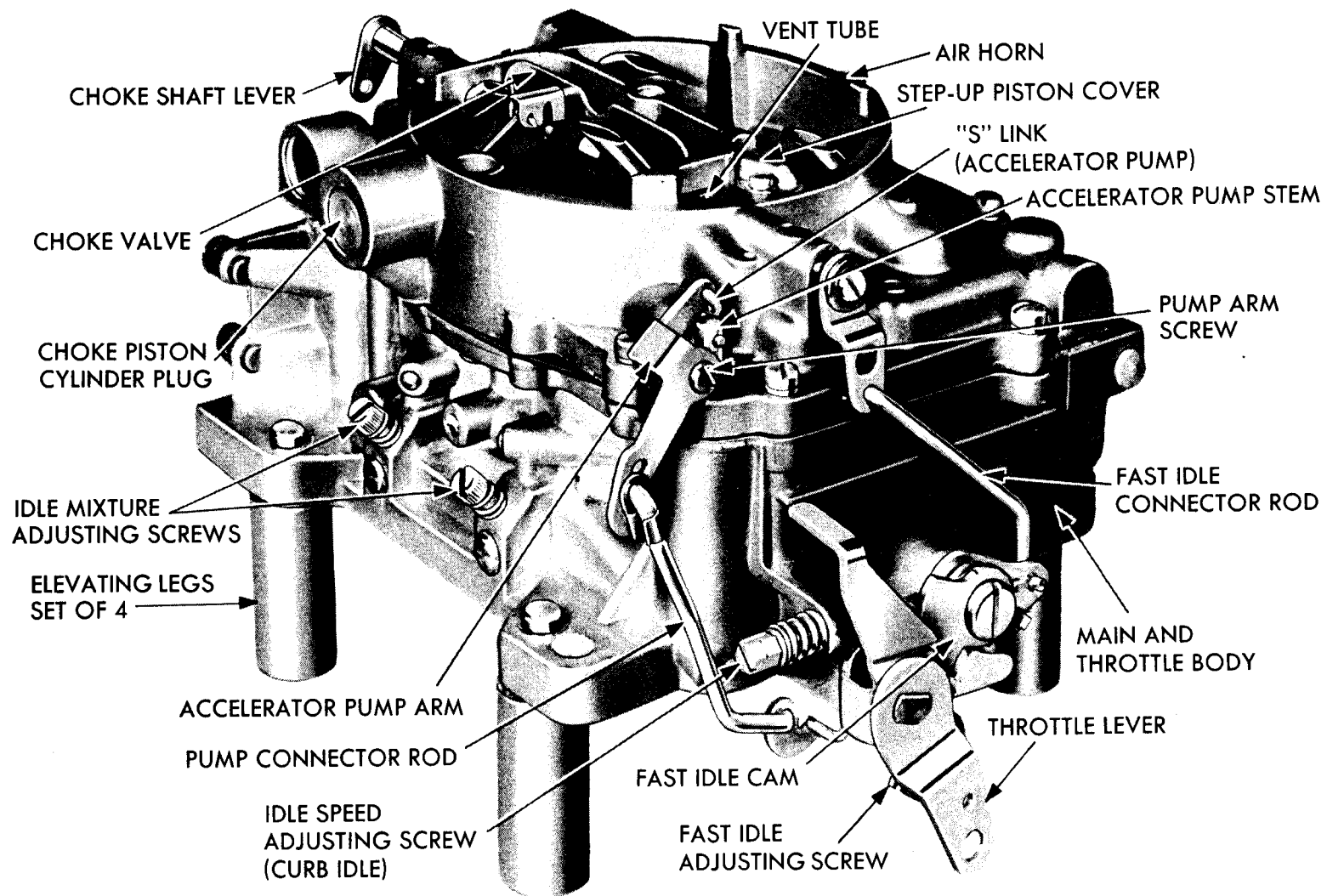


Figure 16 — Carter Carburetor Assembly AFB-3134S

ACCELERATOR PUMP SYSTEM

The accelerator pump system momentarily supplies an extra charge of fuel to the engine when the throttle is opened. The amount of fuel added is proportional to the amount the pedal is depressed. When the accelerator pedal is depressed, the pump plunger spring forces the plunger down and the fuel is discharged past the discharge check ball through the jet and into the air stream. The inlet passage is closed by the inlet check ball as this occurs.

When the accelerator pedal returns, the pump plunger is pulled up drawing a new charge of fuel past the inlet check ball. The discharge check ball is closed, preventing air bleeding into the passage when the pump plunger is pulled up.

When the engine is operated at high speeds, a vacuum exists at the accelerator pump jet. To prevent fuel being drawn out of the pump system, the pump jet air bleed is vented through a passage in the air horn to the float bowl.

A vent is also provided in the plunger to relieve vapor pressure developed by heat in the pump system.

The Carter Model AFB 3134S carburetor is basically two (2) dual carburetors contained in one assembly. (Fig. 16) The section containing the metering rods, accelerating pump and choke is termed the primary side of the carburetor, the other section, the secondary side. It has five (5) conventional systems, as have been used in previous carburetors. They are:

- 2 — Float System
- 2 — Low Speed System
- 2 — High Speed System
- 1 — Pump System
- 1 — Integral Automatic Choke System

FLOAT SYSTEMS

The purpose of the float systems is to maintain an adequate supply of fuel at the proper level in the bowls for use by the low-speed, high-speed, pump and choke systems. Primary, and secondary bowls are separated by a partition. The fuel line connection is above the primary needle and seat. Fuel is supplied to the secondary needle and seat through the passage in the air horn.

Setting the floats to specifications assures an adequate supply of fuel in the bowls for all operating conditions. Float adjustments must be made with the air horn gasket removed and should be checked vertically

(specified distance between air horn and floats) and laterally (sides of floats should just clear the arms of gauge). Correct lateral adjustment is important. If the floats are misaligned, they may bind or drag against the inner walls of the bowl. Adjust by bending the float arms.

Needle valves and seats are carefully matched during manufacture. Do not use the primary needle in the secondary seat or vice versa. To avoid unnecessary bending, both floats should be reinstated in their original positions and then adjusted.

The bowls are vented to the inside of the air horn and also to atmosphere. Bowl vents are calibrated to provide proper air pressure above the fuel at all times. To assure a positive seal, always use a new air horn gasket when reassembling. An air leak at this point can result in a mileage complaint.

A connecting passage along one side of the body effects a balance of the fuel levels and air pressures between the two bowls.

LOW SPEED SYSTEM

Fuel for idle and early part throttle operation is metered through the low speed system.

Gasoline enters the idle wells through the metering rod jets on the primary side of the carburetor and through the main metering jets on the secondary side.

The low speed jets measure the amount of fuel for idle and early part throttle operation. The air by-pass passages, economizers and idle air bleeds are carefully calibrated and serve to break up the liquid fuel and mix it with air as it moves through the passages to the idle ports and idle adjustment screw ports. Turning the idle adjustment screws toward their seats reduces the quantity of fuel mixture supplied by the idle system.

There are no idle adjustment screws on the secondary side of the carburetor.

The idle ports are slot shaped. As the throttle valves are opened more of the idle ports are uncovered allowing a greater quantity of the gasoline and air mixture to enter the carburetor bores.

All by-passes, economizers, idle ports, idle adjustment screw ports, as well as the bore of the carburetor flange must be clean and free of carbon. Obstructions will cause poor low speed engine operation. Worn or damaged idle adjustment screws or low speed jets should be replaced.

HIGH SPEED SYSTEM

Fuel for part throttle and full throttle operation is supplied through the high speed system.

PRIMARY SIDE

The position of the metering rods in the metering rod jets control the amount of fuel flowing in the high speed system of the primary side of the carburetor. The position of the metering rods is controlled mechanically by movement of the throttle and by manifold vacuum applied to the vacuum piston on the vacuumeter link.

SECONDARY SIDE

Fuel for the high-speed system of the secondary side is metered at the main metering jets (no metering rods used).

Throttle valves in the secondary side remain closed until the primary throttle valves have been opened a pre-determined amount. They reach the wide open throttle position at the same time the primary throttle does. This is accomplished by linkage between the throttle levers.

The AFB 3134S carburetor is equipped with a pair of velocity valves, which control the secondary valve operation. The throttle valves of the secondary half of the carburetor are mechanically connected to the primary valves and open with the primary after an approximate 60° lag; and continue to open until both primary and secondary throttle valves reach the wide open position simultaneously. As engine speed increases, the forces exerted by the velocity of intake air down through the venturis of the carburetor increases and tends to overcome the counterweight attached to the velocity valve shaft, permitting the offset velocity valves to position themselves according to engine requirements.

When the engine is cold and the choke is in closed position, a mechanical latch prevents the velocity valves from opening, so that only the primary side of the carburetor is used during the warm-up period. After the choke is opened fully, the latch is released, and allows operation of the velocity valves according to engine requirements.

ANTI-PERCOLATOR

To prevent the vapor bubbles in the nozzle passages and low-speed wells caused by heat from forcing fuel out of the nozzles, anti-percolator passages, and calibrated plugs or bushings are used. Their purpose is to vent the vapors and relieve the pressure before it is sufficient to push the fuel out of the nozzles and into the intake manifold. Anti-percolator plugs, bushings, and main nozzles are permanently installed and must not be removed in service.

PUMP SYSTEM

The pump system is found only in the primary side of the carburetor.

The accelerating pump system provides a measured amount of fuel, which is necessary to insure smooth engine operation for acceleration.

When the throttle is closed, the pump plunger moves upward in its cylinder and fuel is drawn into pump cylinder, and past the intake check-ball. The discharge check needle is seated at this time to prevent air being drawn into the cylinder. When the throttle is opened the pump plunger moves downward forcing fuel out through the discharge passage, past the discharge check needle, and out of the pump jets. When the plunger moves downward the intake checkball is closed preventing fuel from being forced back into the bowl.

If the throttle is opened suddenly, the upper pump spring will be compressed by the plunger shaft telescoping, resulting in a smoother pump discharge of longer duration.

When the throttle valves are opened, a predetermined amount, the pump plunger bottoms in the pump cylinder eliminating pump discharge due to pump plunger movement at high speeds.

During high speed operation a vacuum exists at the pump jets. To

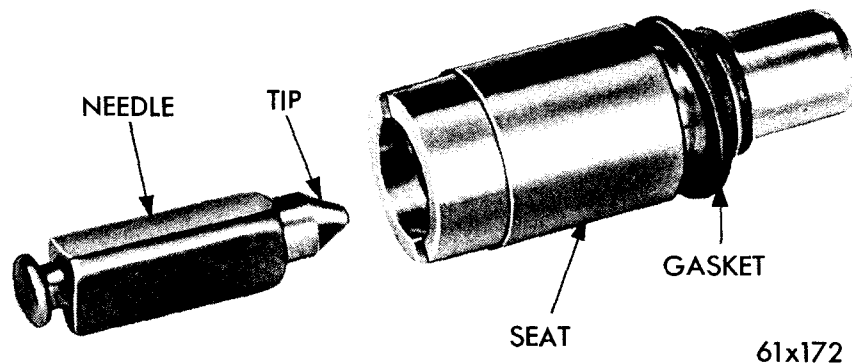
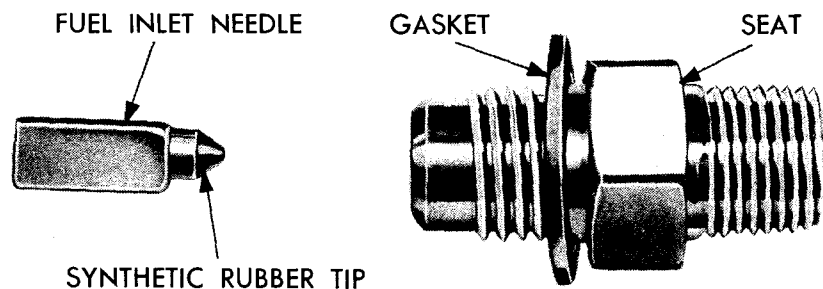


Figure 17 — Rubber Tipped Fuel Inlet Needle for AFB Carburetors



61x201

Figure 18 — Synthetic Rubber Tipped Needle, Seat and Gasket Used on Carburetors BBD and WW3

prevent fuel from being drawn through the pump system the passage to the pump jets is vented by a cross passage to the carburetor bowl above the fuel level. This allows air instead of fuel to be drawn off the pump jets.

SYNTHETIC RUBBER-TIPPED FUEL INLET NEEDLE

The BBD Series carburetor, the AFB Series carburetor and the WW3 Series carburetor are equipped with new synthetic rubber-tipped fuel inlet needles (Fig. 17 and 18). The needle tip is a rubber-like material which is not affected by gasoline and is stable over a wide range of temperatures. The tip is flexible enough to make a good seal on the needle seat, and to give increased resistance to flooding.

GOVERNORS

Pierce Governor

Some engines are equipped with a mechanical type, gear-driven governor. Governor weights revolving with the mainshaft through centrifugal force cause the rocker shaft and operating lever to rotate. The operating lever is connected to the carburetor throttle. A calibrated spring attached to the operating lever opposes the effort exerted by the governor weights. The engine speed is governed by the balance of the two forces.

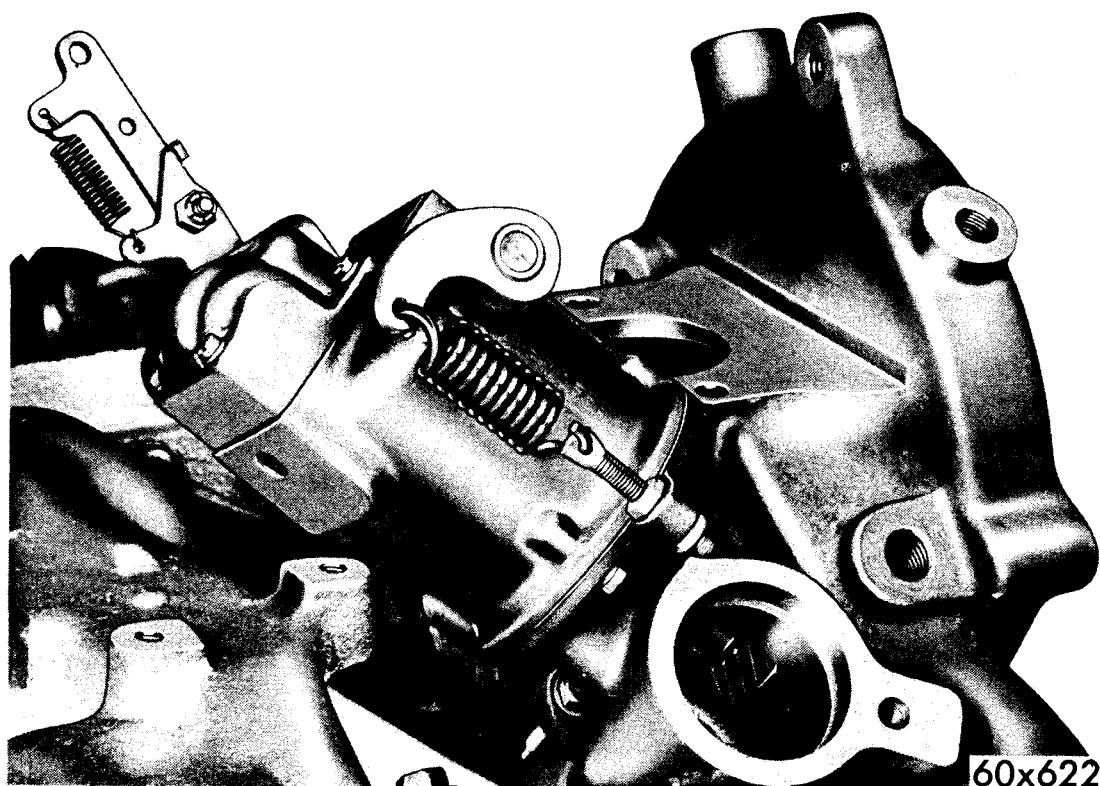


Figure 19 — Pierce Mechanical Gear Driven Governor

Speed and sensitivity are set by the end product manufacturer to provide accurate control. Provision is made for adjustment to vary sharpness of control, and to correct surge. The governor may also be adjusted for governed engine speed. (Fig. 19).

King Seeley Governor

The velocity type King Seeley governor (Fig. 20), used on some engines, is of the sandwich type. Engine speed is governed by the throttle valve which is closed by the velocity of the fuel-air mixture as it passes through the governor. An accurately calibrated spring system attached to the throttle shaft opposes the velocity and controls the position of the throttle valve and the maximum speed of the engine. When in proper operating condition, the governor does not affect engine performance below the speed at which it begins to control, and does not affect fuel consumption.

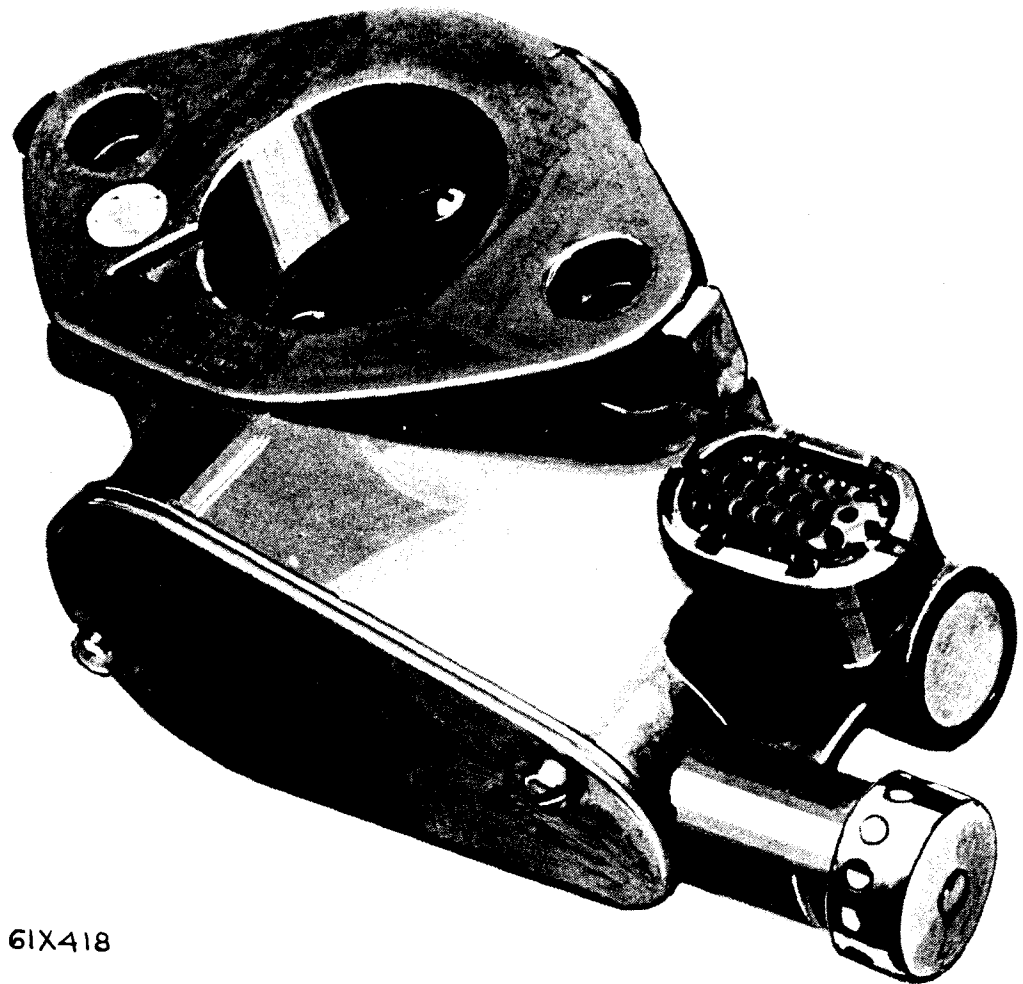


Figure 20 — Velocity Type King Seeley Governor

HOOF VELOCITY GOVERNOR

As the mixture of gasoline and air passes through the governor, it strikes against the governor valve, forcing it toward a closed position, which would close off completely were it not for the opposing action or

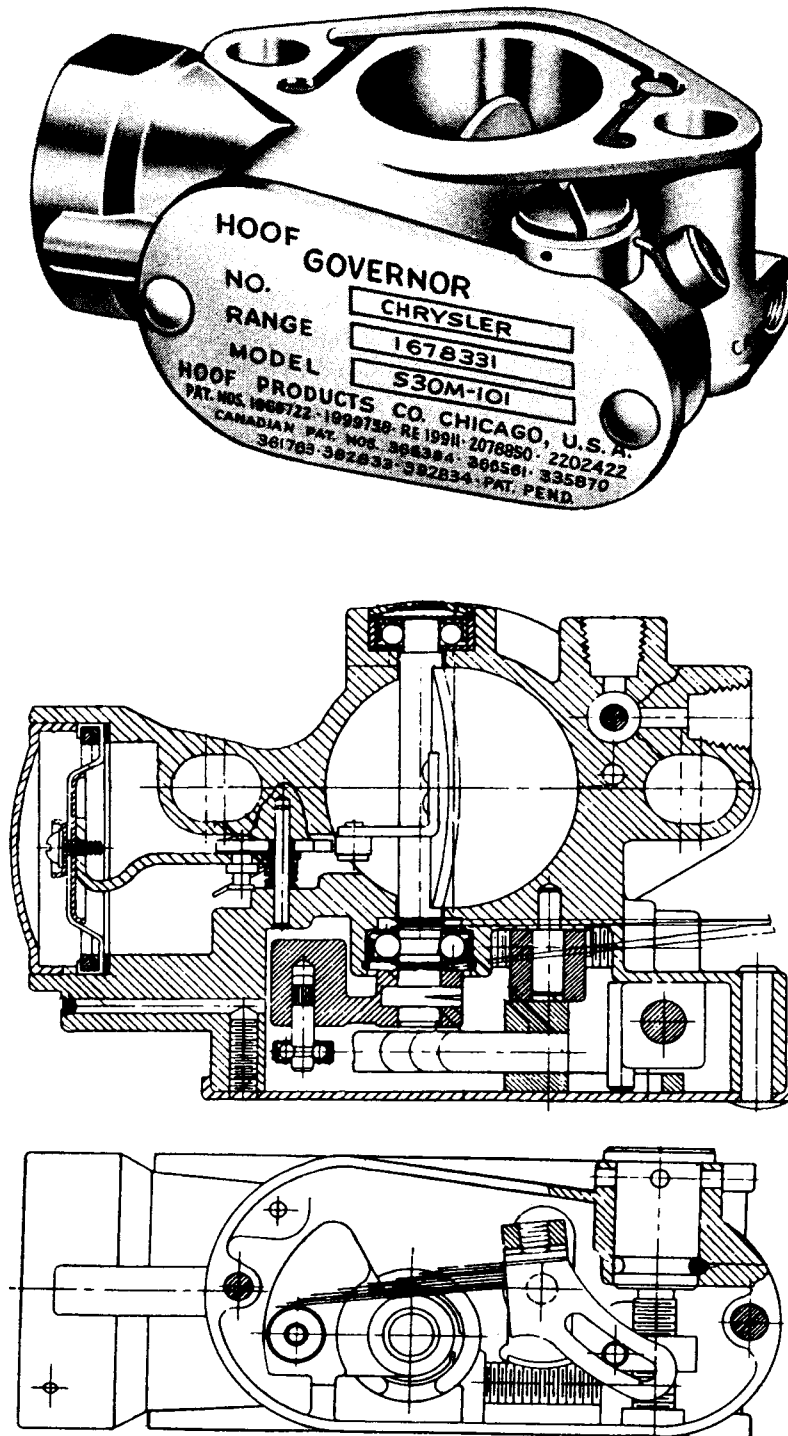
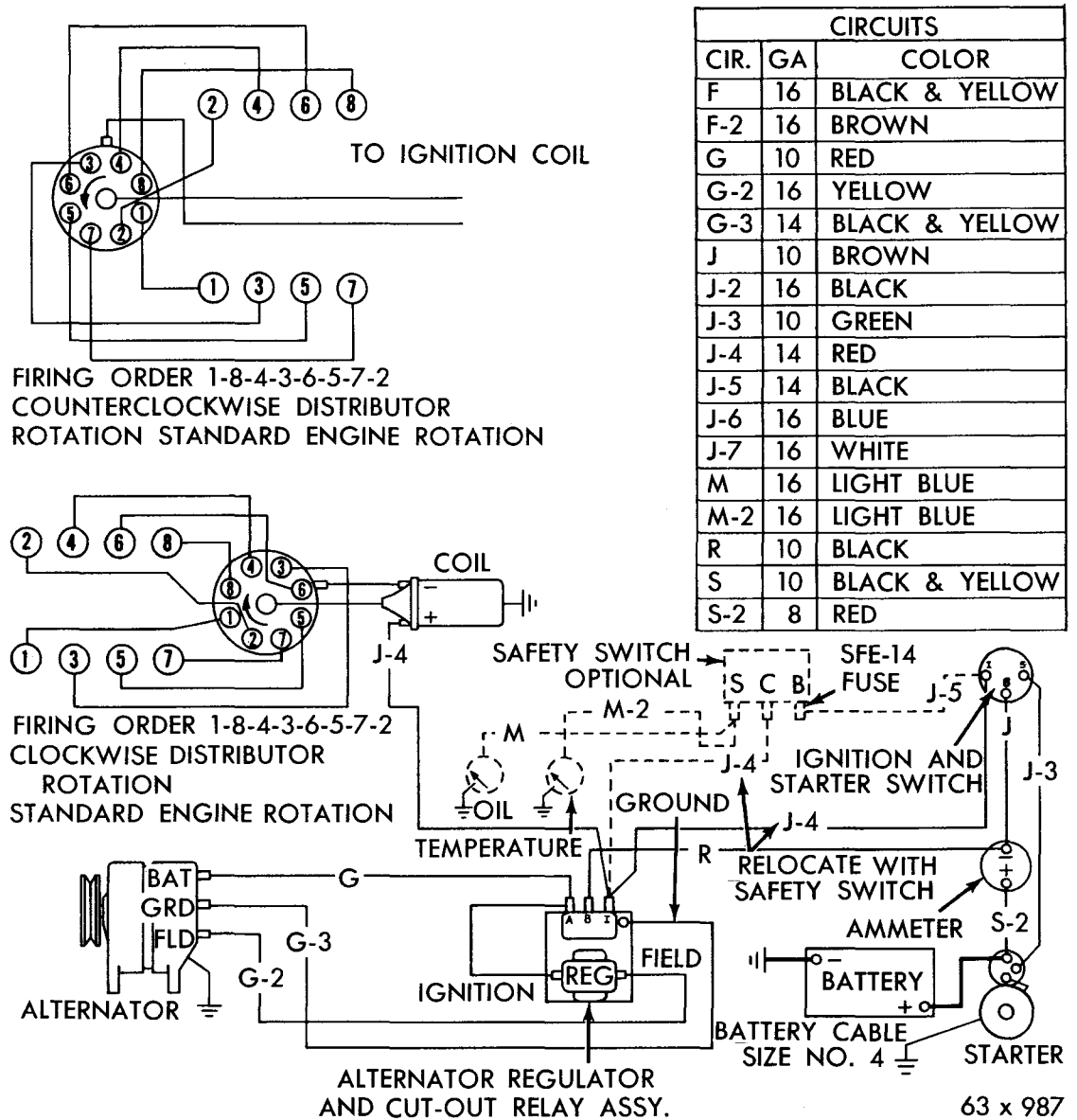


Figure 21 — Hoof Velocity Governor 61X210

force of the governor spring. When the closing action of the valve exactly balances the spring, governing action takes place and maximum speed is fixed at this point. When load is applied — the engine speed tends to drop — the velocity of the gas through the manifold and the pressure against the governor valve is reduced and the spring opens the governor valve to feed more gasoline to the engine to meet increased load demand. Thus, an almost constant speed is maintained whether the engine is running with or without load. (Fig. 21)

ELECTRICAL SYSTEM

The electrical system includes an alternator, voltage regulator,



starting motor, starting motor solenoid, ignition distributor, ignition coil, spark plugs together with the necessary cables, connecting wires, ammeter and switches (Fig. 22 and 23).

Alternator

The alternator (Fig. 24) is fundamentally an alternating current generator with six built-in silicon rectifiers that convert the alternating current into direct current, which is available at the output "BAT" terminal.

A regulator (Fig. 25) limits the direct current voltage output. The

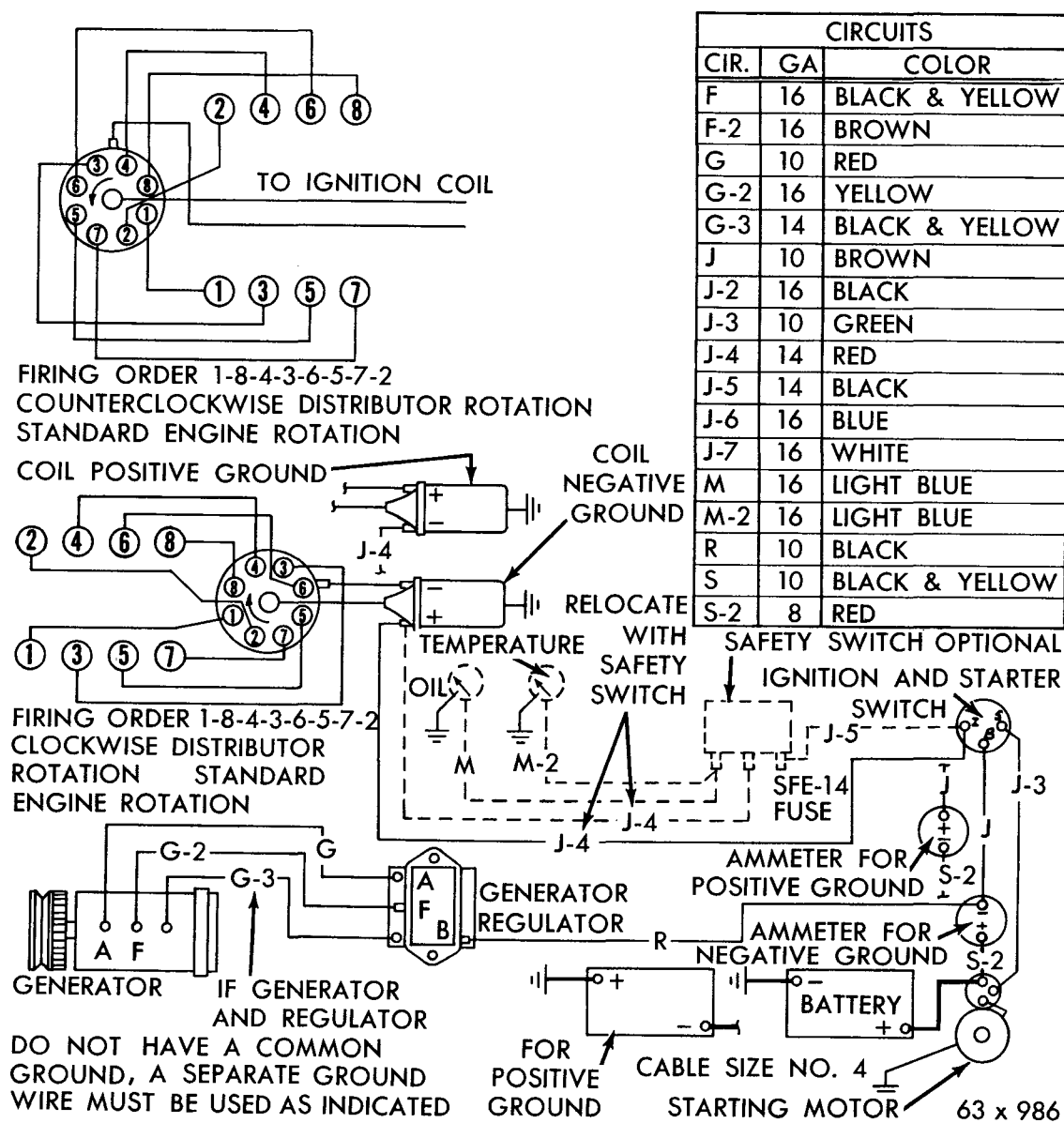


Figure 23 — Chrysler 8-Cylinder Industrial Engine Wiring Diagram (Generator Equipped) (All Models)

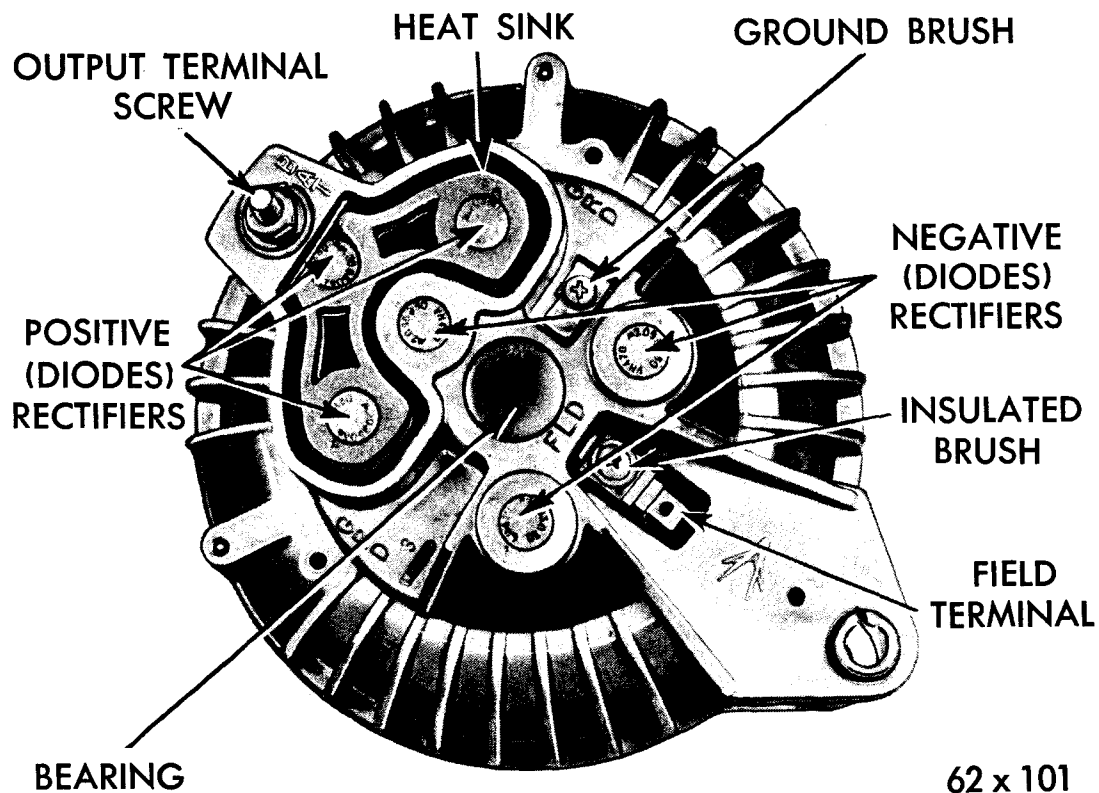


Figure 24 — Chrysler 8-Cylinder Alternator Assembly (All Models)

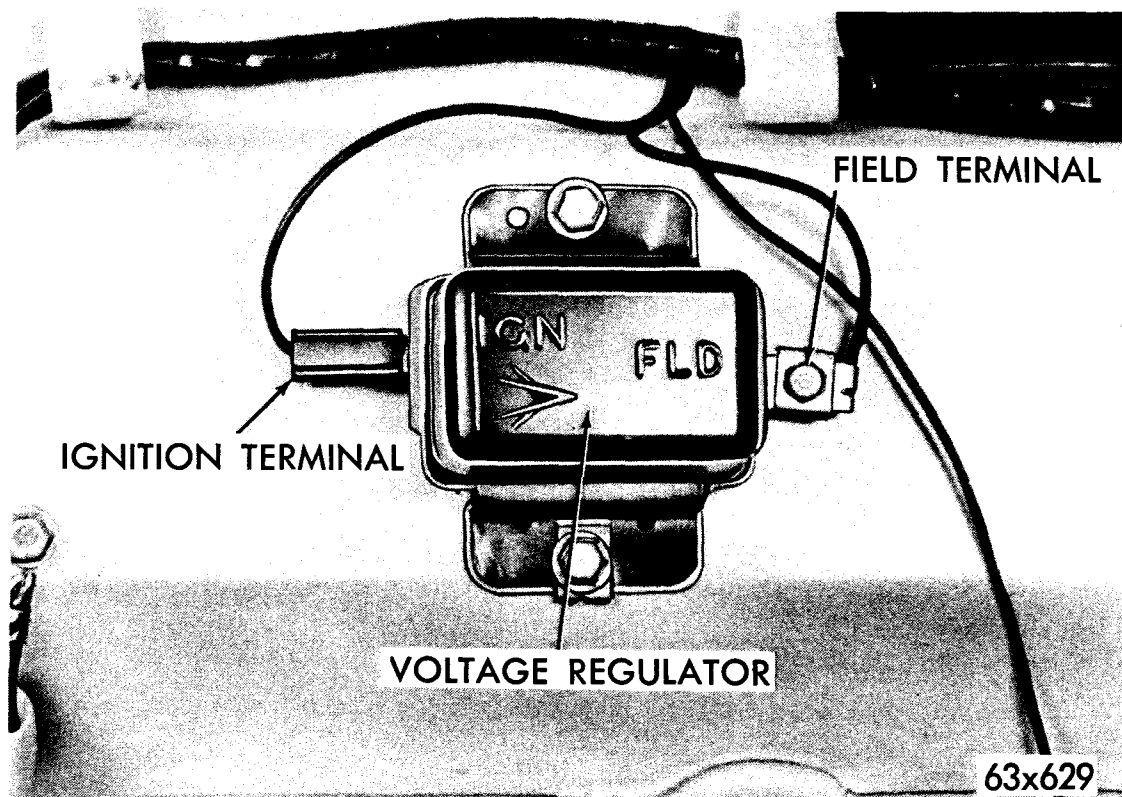


Figure 25 — Voltage Regulator (Assembled)

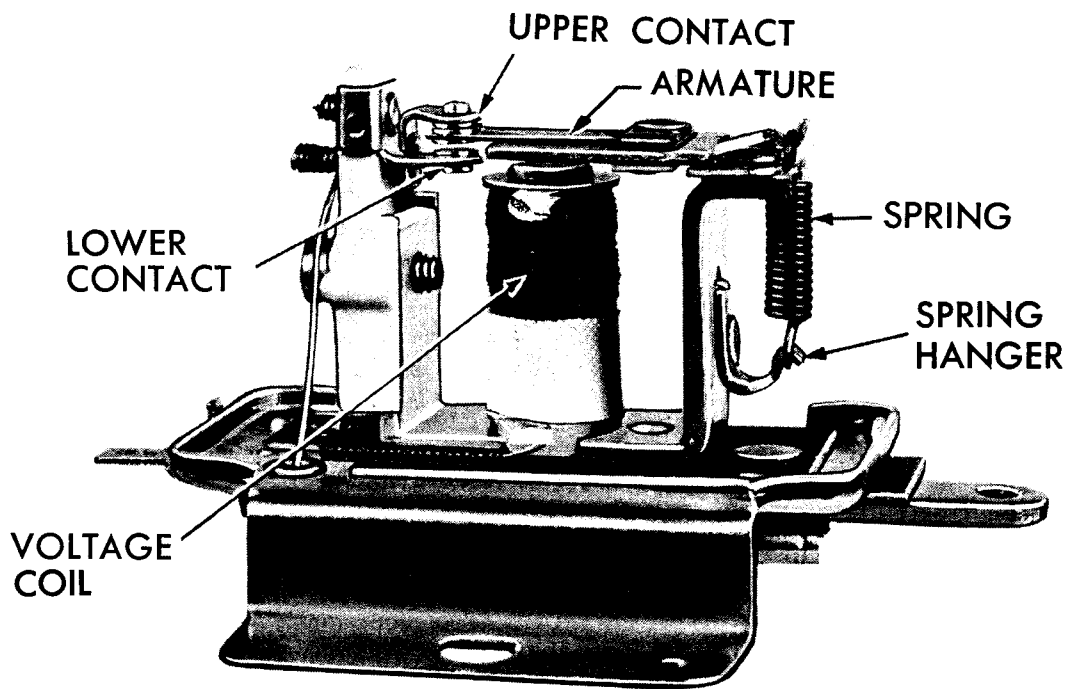


Figure 26 — Voltage Regulator (Cover Removed) 61X232

voltage regulator accomplishes this by controlling the flow of current in the rotor field coil and in effect controls the strength of the rotor magnetic field.

The voltage regulator has two sets of contacts using a common single armature (Fig. 26). The upper and lower stationary contact

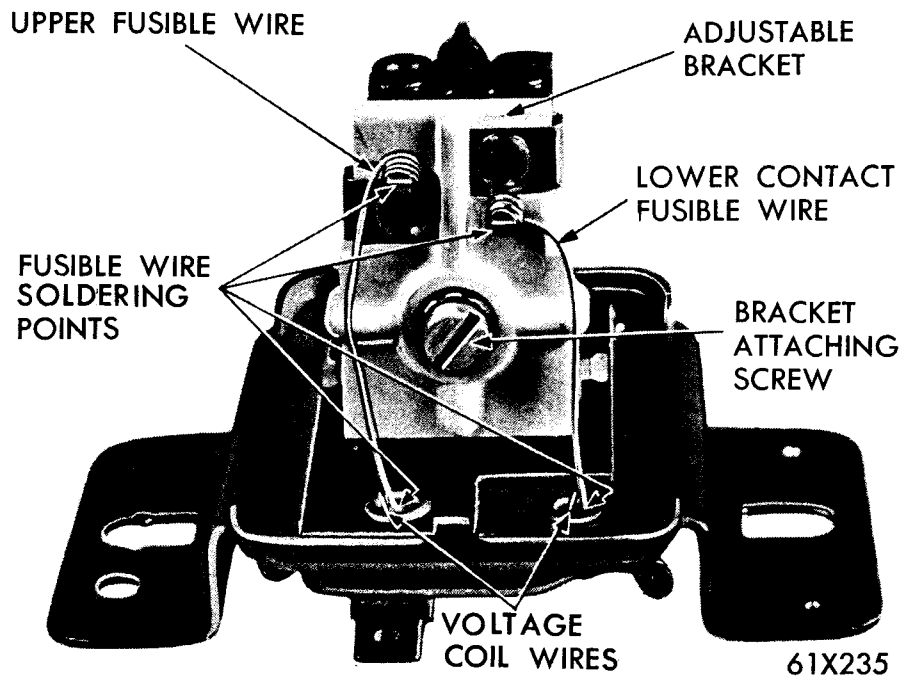


Figure 27 — Voltage Regulator Fusible Wires

brackets are mounted on a molded plastic bracket which is attached to the regulator frame by two screws. The upper contact bracket is connected to the "IGN" terminal by a fusible wire (Fig. 27). The lower contact bracket is connected to ground by a fusible wire. The armature is connected to the insulated "FLD" terminal.

IMPORTANT: Extreme caution must be exercised when installing a battery, attaching a battery charger or using a booster battery to start the engine, in order to prevent extensive damage to the electrical circuits which can result from reverse polarity or excessive voltage.

In all cases where a "Fast Charger" type battery charger is to be used, both of the battery cables must be disconnected from the battery. Never use a "Fast Charger" as a booster to provide starting voltage.

When using a booster battery the negative lead of the booster battery must be connected to the negative (ground) terminal of the battery and the positive lead to the positive terminal of the battery.

CAUTION: Reversing the polarity on an alternator system will immediately burn out the wiring harness and may possibly damage the alternator. (See Schematic Wiring Diagram, (Fig. 22 and 23).

Starting System

The Starting System consists of a 12-volt starting motor with an actuating switch mounted on the starting motor and a battery to starter solenoid switch cable. With the ignition switch key turned to the "ON" position and the transmission lever in neutral position (Power Torque & Automatic Transmission), pressing the starter button on the control panel, current from a 12-volt battery energizes the magnetic switch in the solenoid closing the relay switch — the circuit from the battery to the starting motor is then completed through the battery cables and the solenoid switch.

Ignition System

The ignition distributor is driven by a shaft which engages the oil pump shaft. The distributor times and distributes ignition current.

With the engine running, an electrical current flows from the ignition switch through the primary winding in the coil to the ignition points in the distributor and then to ground. As this circuit is interrupted, an induced high tension (voltage) current is started in the coil. This high tension current flows from the tower on the coil to the center tower of the distributor cap and to the rotor under the cap. The rotor distributes the current to the end towers of the cap and the eight wires carry the current to the spark plugs.

The ignition points in the distributor constitute an off-and-on switch in the primary circuit. A condenser in the primary circuit is also located in the distributor. The condenser absorbs the electrical surge which is produced each time that the ignition points break the circuit. The condenser reduces arcing at the points and hastens the collapse of the magnetic field in the coil.

An automatic centrifugal advance built into the distributor provides proper ignition timing in relation to engine speed in conjunction with an automatic vacuum spark advance system which increases part throttle fuel efficiency.

Spark Plugs

Standard spark plugs supplied are as follows:

Engine Models	Spark Plugs (Champion)
H-318	J10Y
HB-318	J10Y
HC-318	J10Y
HT-318	J10Y
H-361	J12Y
HB-361	J12Y
HC-361	J12Y
HT-361	N-6
H-413	J12Y
HB-413	J12Y
HC-413	J12Y
HC1-413	J12Y
HT-413	N-6

The gap at the spark plug electrodes should be set at .035 inch.

CARBURETOR AIR CLEANERS — (OPTIONAL EQUIPMENT)

Oil Bath Type

An oil bath air cleaner, shown in Fig. 28, is provided on most engines to afford maximum protection against dirt, dust and abrasives entering the engine. Under normal conditions, the air cleaner should be examined at each recommended crankcase oil change interval. If the sump is found to contain a semi-solid mixture of dirt and oil up to the lower offset in the reservoir, the air cleaner should be removed and thoroughly cleaned. Remove cover and filter element assembly, rinse clean in kerosene and drain. Empty the dirty oil from the reservoir, clean out the sump, and refill to indicated level with the following viscosity engine oil:

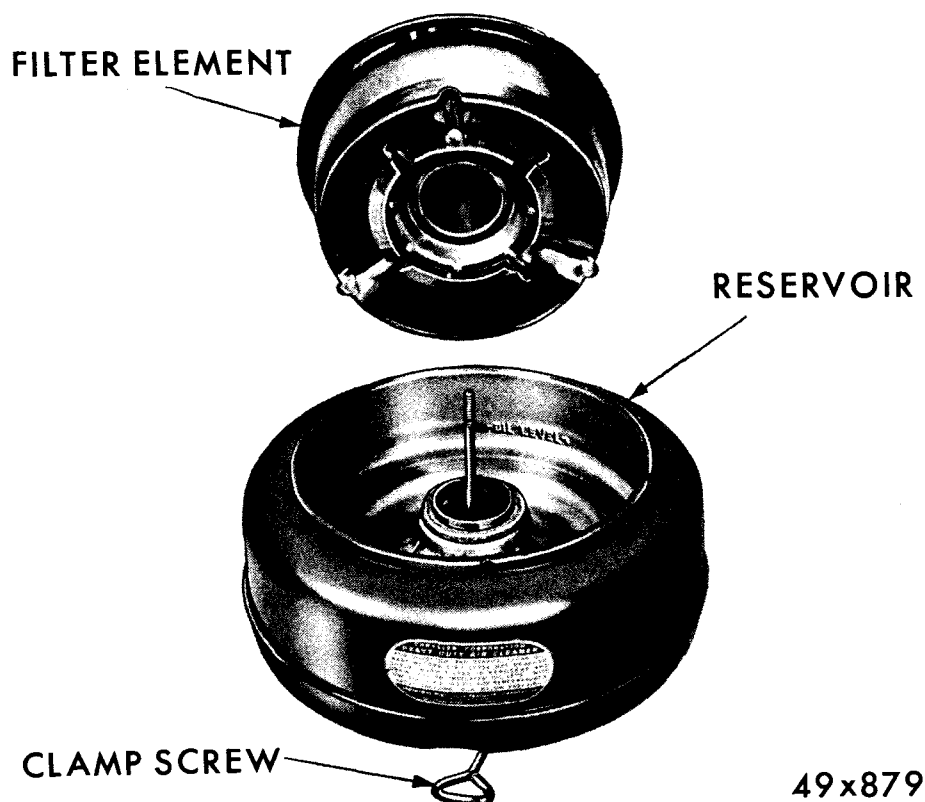


Figure 28 — Carburetor Air Cleaner (Oil Bath Type)

Above + 32°F	SAE 30
Below + 32°F	SAE 20W

IF THE ENGINE IS OPERATED IN DUSTY TERRITORIES, THE AIR CLEANER WILL REQUIRE MORE FREQUENT ATTENTION. FOR EXTREME CONDITIONS SERVICING THE CLEANER AS OFTEN AS ONCE A DAY MAY BE NECESSARY.

CARBURETOR AIR CLEANER — DRY TYPE — (OPTIONAL EQUIPMENT)

The filter element should be cleaned every 50 hours under normal service conditions. (Fig. 29)

Remove cleaner assembly, remove paper element, blow out dirt gently with air hose. Direct air from inside out, and keep nozzle one inch away from element to avoid damaging.

DO NOT TAP OR IMMERSE ELEMENT IN LIQUID

Wash the cleaner cover and body with cleaning solvent, and wipe dry. Replace paper element, center and secure firmly. Replace cleaner assembly on engine.

All engines operating in dusty areas will require more frequent attention. For this type of service it is recommended that an oil bath type air cleaner be used.

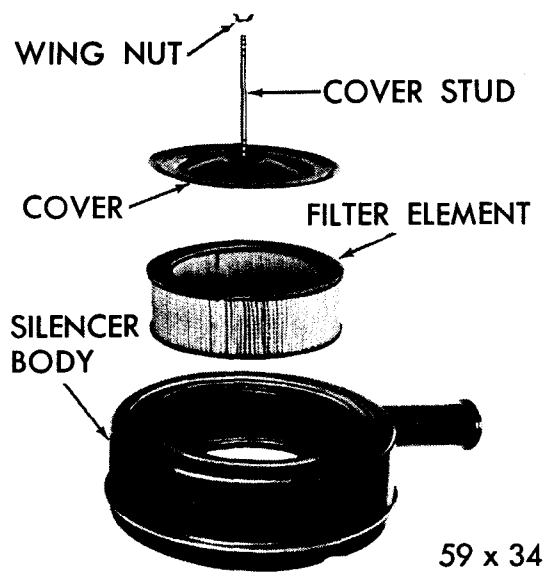


Figure 29 — Carburetor Air Cleaner (Dry Type)

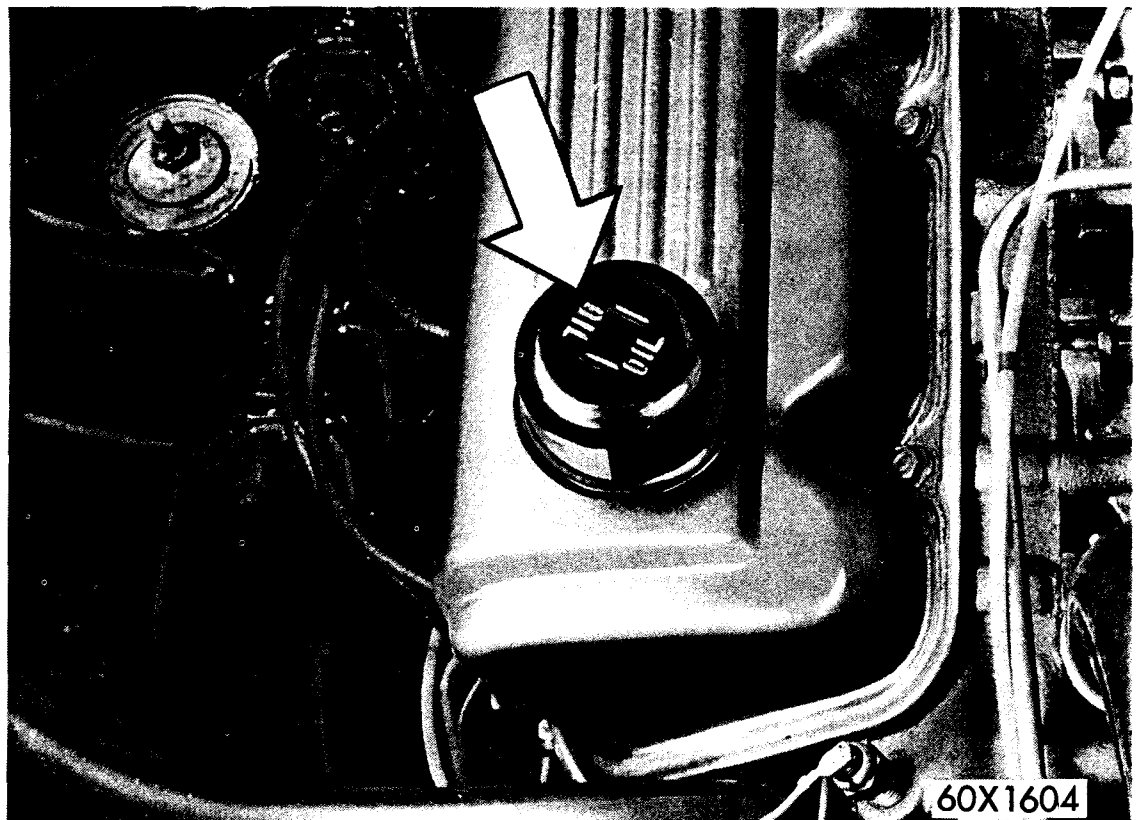


Figure 30 — Oil Filler Filter Cap Air Cleaner

OIL FILLER PIPE AIR CLEANER AND CRANKCASE VENTILATOR OUTLET PIPE AIR CLEANER (WHEN SO EQUIPPED) (FIGURES 30 AND 31)

Wash thoroughly in kerosene, re-oil with SAE 30 engine oil at each recommended crankcase oil change interval or more frequently under dusty conditions.

CLOSED CRANKCASE VENTILATION SYSTEM

(Standard Equipment on HT-351 and HT-413 Models and Optional Equipment on all Other Models)

Closed crankcase ventilation is effected by means of air drawn into the crankcase through the oil filler cap on all H, HB, HC Models (Fig. 32) and through the carburetor air cleaner on all HT Models. The air is circulated through the engine, and drawn out of the right cylinder head cover together with crankcase fumes by manifold vacuum into the combustion chambers and dispelled with the exhaust gases (Fig. 33).

The system consists of the ventilation valve installed on the outlet vent cap on the right cylinder head cover on Models H, HB, HC. The valve is installed in the intake manifold on the HT Models. A rubber



Figure 31 — Crankcase Ventilator Outlet Pipe Air Cleaner

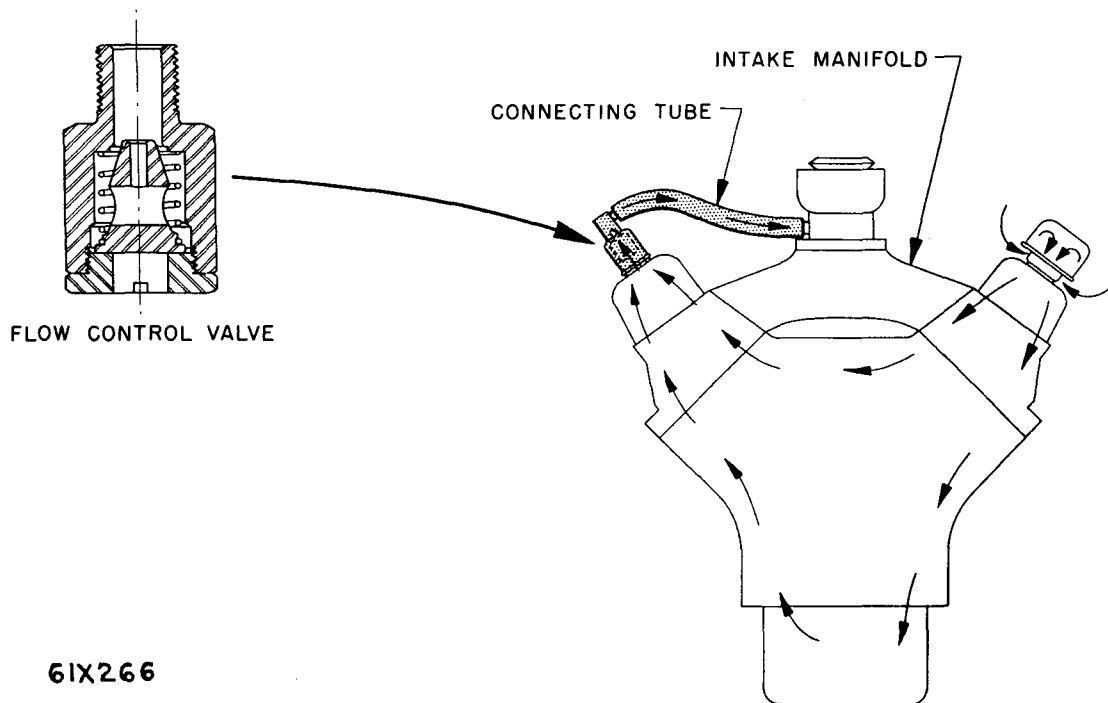


Figure 32 — Closed Crankcase Ventilator System Models H, HB, HC

tube (capable of withstanding 20 inches of vacuum) is connected between the outlet vent cap and the lower part of the carburetor throttle body or spacer on Models HB, HC. A metal tube is connected between the outlet vent cap and the intake manifold on Models HT. The function of the valve is to regulate the flow of crankcase ventilation at various throttle positions.

The system will operate effectively as long as normal maintenance is applied. The valve and tube are subject to fouling with sludge and carbon formation due to the nature of the materials carried through the ventilating system.

SERVICE PROCEDURES

At regular intervals of 100 hours, the regulating valve and the connecting tube should be removed from the engine, disassembled and cleaned thoroughly.

NOTE

Under cold weather operation conditions, when engines are operated at slow speeds with low engine temperatures, more rapid accumulation of harmful fumes may be present in the engine. Under these conditions of operation the valve and tube must be cleaned more frequently than specified above. No specific hourly recommendation, however, can be made under these conditions. Frequency of cleaning must be dictated by experience.

Disassemble the valve (Fig. 34) and clean the valve parts with any good solvent cleaner and blow dry with compressed air.

When reassembling the valve parts, be sure to attach the spring on the valve by pushing the end coil over the tapered end of the valve, over the ridge and into the groove machined just under the head of the valve. **THIS IS VERY IMPORTANT.**

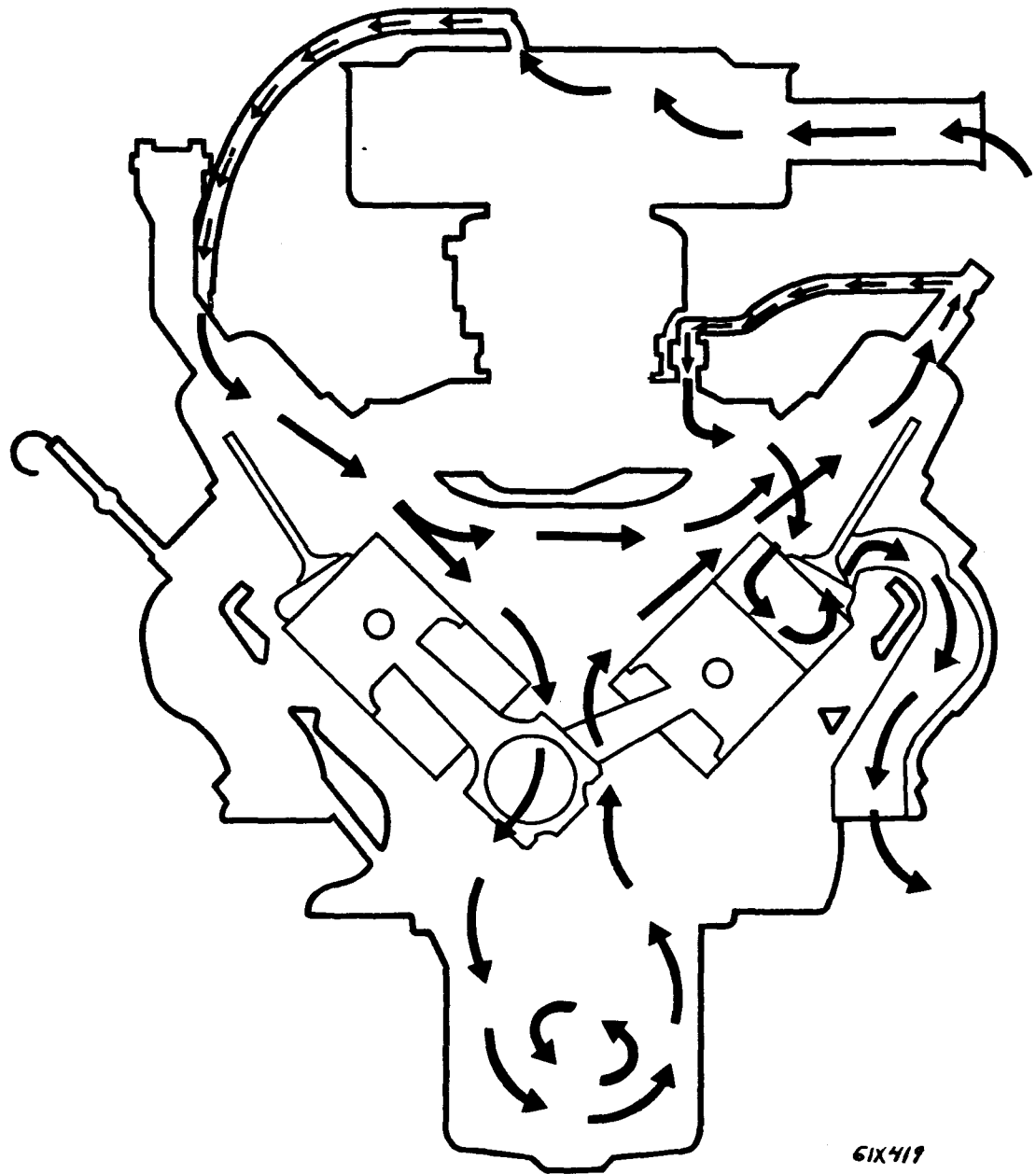
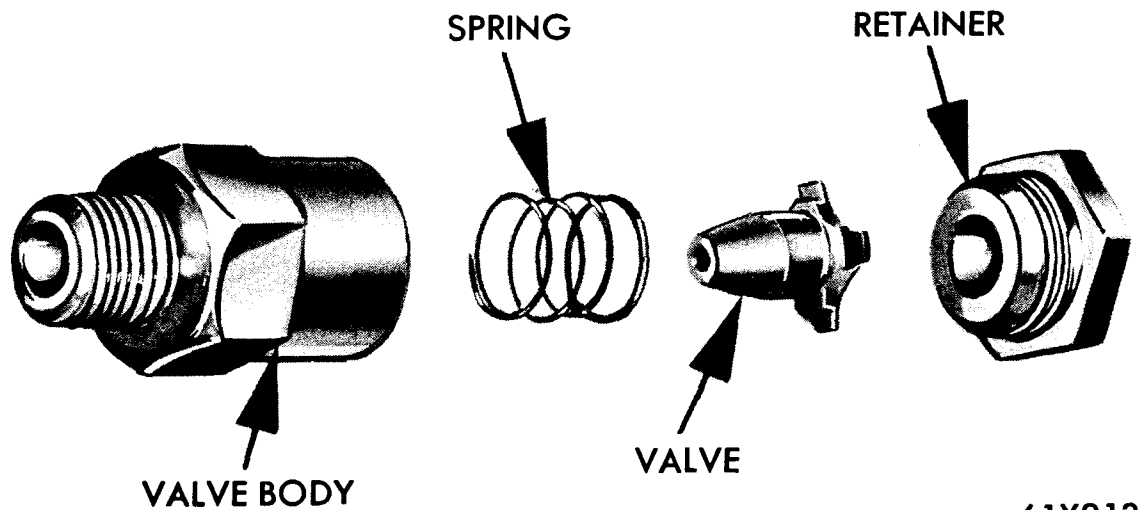


Figure 33 — Closed Crankcase Ventilating System Models HT-361, HT-413



61X213

Figure 34 — Crankcase Ventilation Valve Assembly (Disassembled)

Unless the spring is properly assembled, the valve will not contact the valve seat squarely and will not close properly. Consequently, the engine will not idle properly due to the entrance of too much air into the intake manifold. If the spring has been stretched the same trouble may occur.

If improper action of the spring is suspected due to spring being distorted, bent or etched from corrosive action, the valve assembly should be replaced.

EXHAUST SYSTEM

Exhaust from the combustion chambers passes through the exhaust valve ports into the exhaust manifold and out through the exhaust pipe. The H, HB, HC, HC1, V-8 Industrial Engines are equipped with a manifold heat control valve, which permits faster warmup of the engine by diverting exhaust gas from the right engine bank through a by-pass port and hot spot chamber in the intake manifold and out through the left exhaust manifold. The HT-361 and HT-413 engines employ a water heated intake manifold where hot water is continuously circulated around the intake manifold carburetor flange mounting pad, and do not have a manifold heat control valve.

The manifold heat control valve is located between the right exhaust manifold and the exhaust pipe. It consists essentially of a butterfly type valve operating on a shaft in a housing. Movement of the valve is controlled by a flat coil spring and a counterweight. The inner end of the spring fits in a slot in the valve shaft; the outer end contacts one of two stop pins; which also serve to limit travel of the valve. The counter-

weight fits over the outer end of the valve shaft, and is held with a key and clamp bolt. Bumpers and an anti-rattle spring keeps the mechanism quiet.

When the engine is cold, the tension of the coil spring holds the valve in the closed position, restricting the exhaust passage. As the engine warms up, the spring loses enough tension to permit the counterweight to rotate the shaft and open the valve. The outer end of the spring must contact the correct stop pin to provide proper spring tension. Otherwise the counterweight cannot overcome the spring tension to open the valve.

The heat well which actuates the carburetor automatic choke is located in the hot spot chamber of the intake manifold. Therefore, efficient operation of the automatic choke depends upon proper functioning of the manifold heat control valve.

MANIFOLD HEAT CONTROL VALVE

Each time the engine is lubricated, apply Manifold Heat Control Valve Solvent, MoPar Part Number 1879318, to each end of the valve shaft when the manifold is cool. Work the valve back and forth a few times to distribute the solvent and to be sure the valve is free. (Fig. 35)

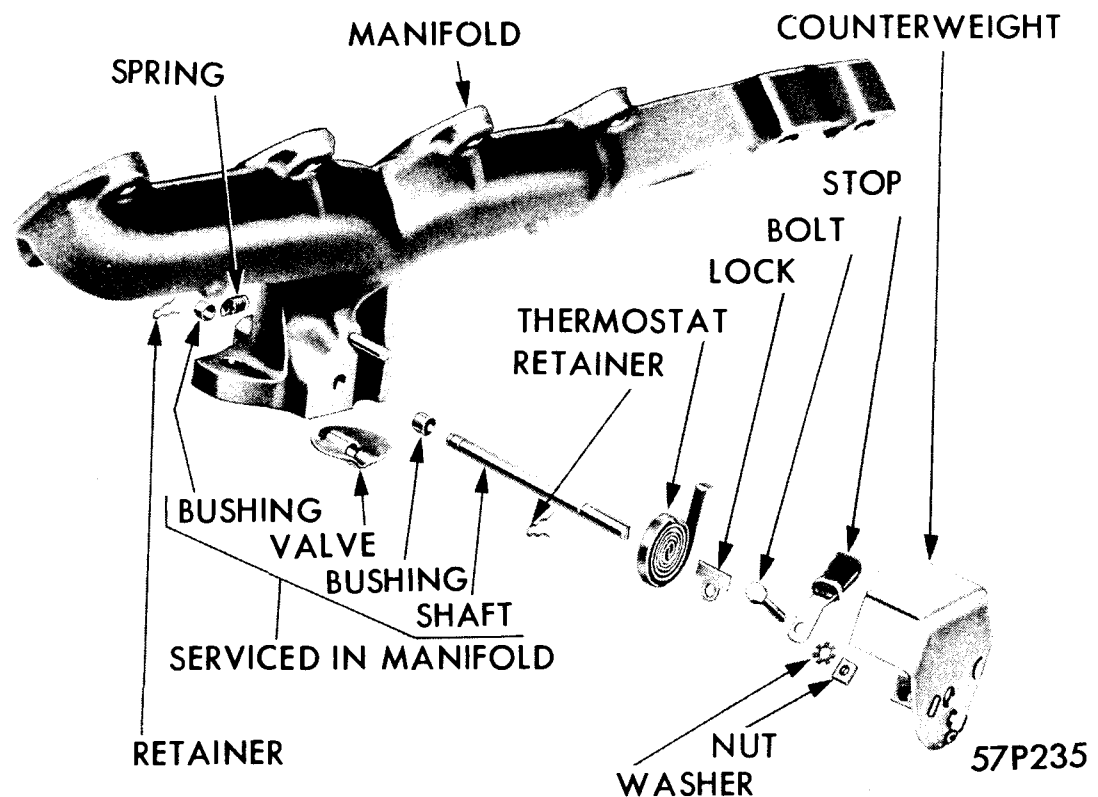
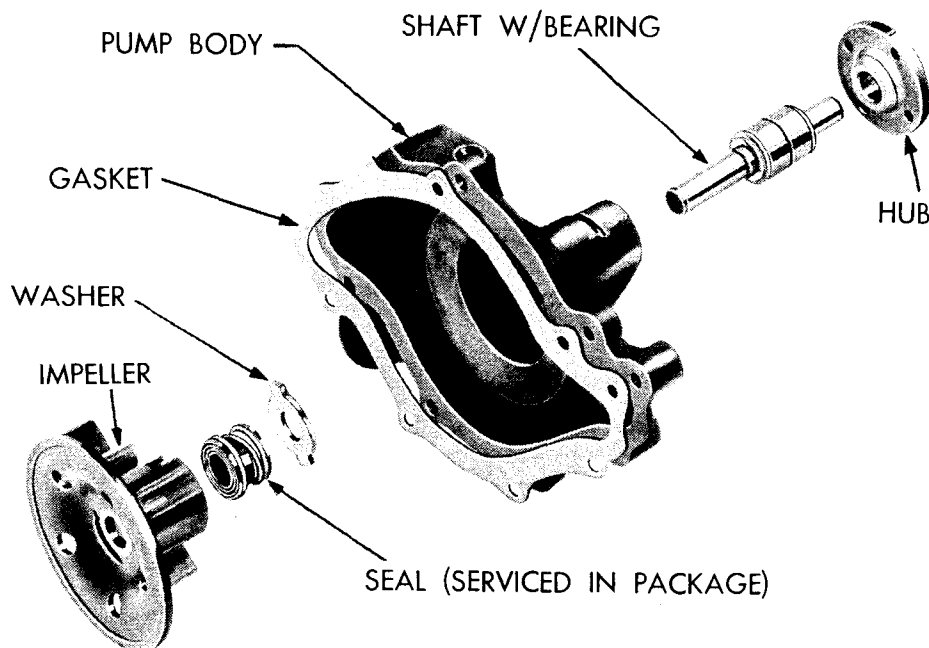


Figure 35 — Manifold Heat Control Valve (Disassembled)

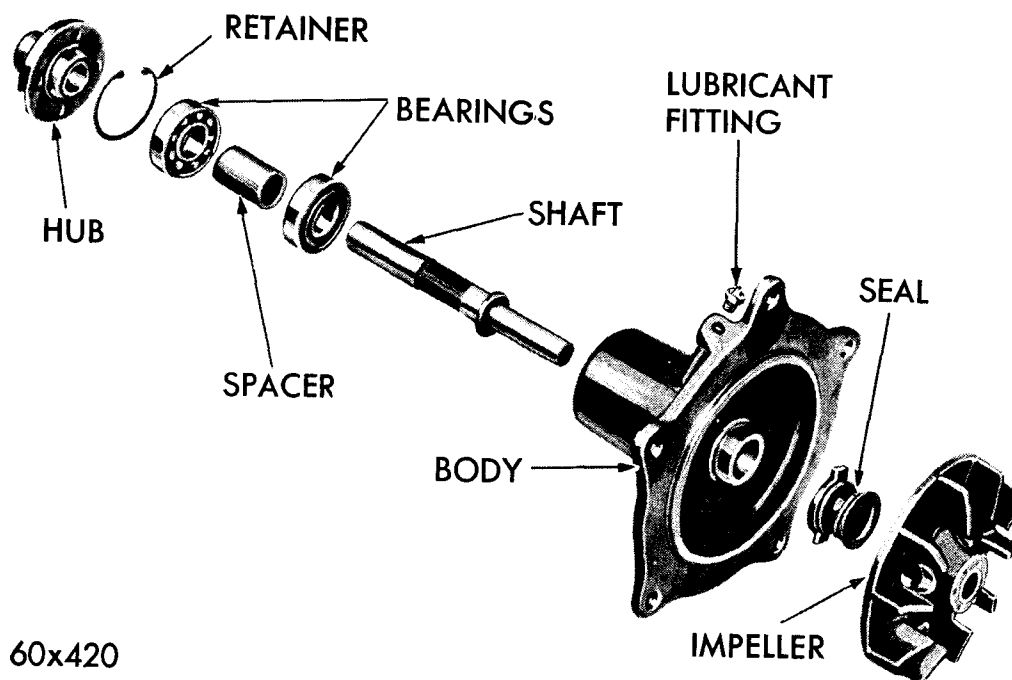
COOLING SYSTEM (Figs. 36 and 37)

The belt driven centrifugal type water pump circulates water from the radiator, or heat exchanger, to the cylinder blocks, completely around each cylinder bore, out the top of the cylinder block into the cylinder heads, around the exhaust valve ports, into special passages to the ther-



58P84

Figure 36 — Water Pump (Disassembled) Models H-318, HB-318, HC-318



60x420

Figure 37 — Water Pump (Disassembled) Models H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413, HT-413

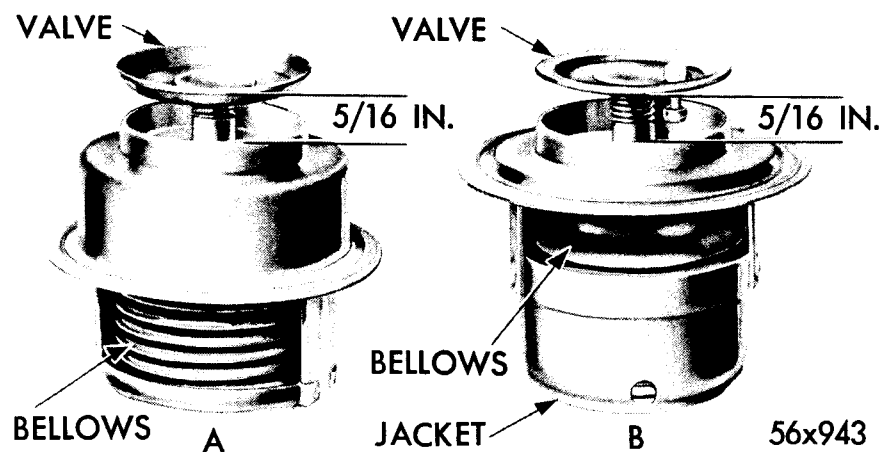


Figure 38 — Thermostats (Typical)

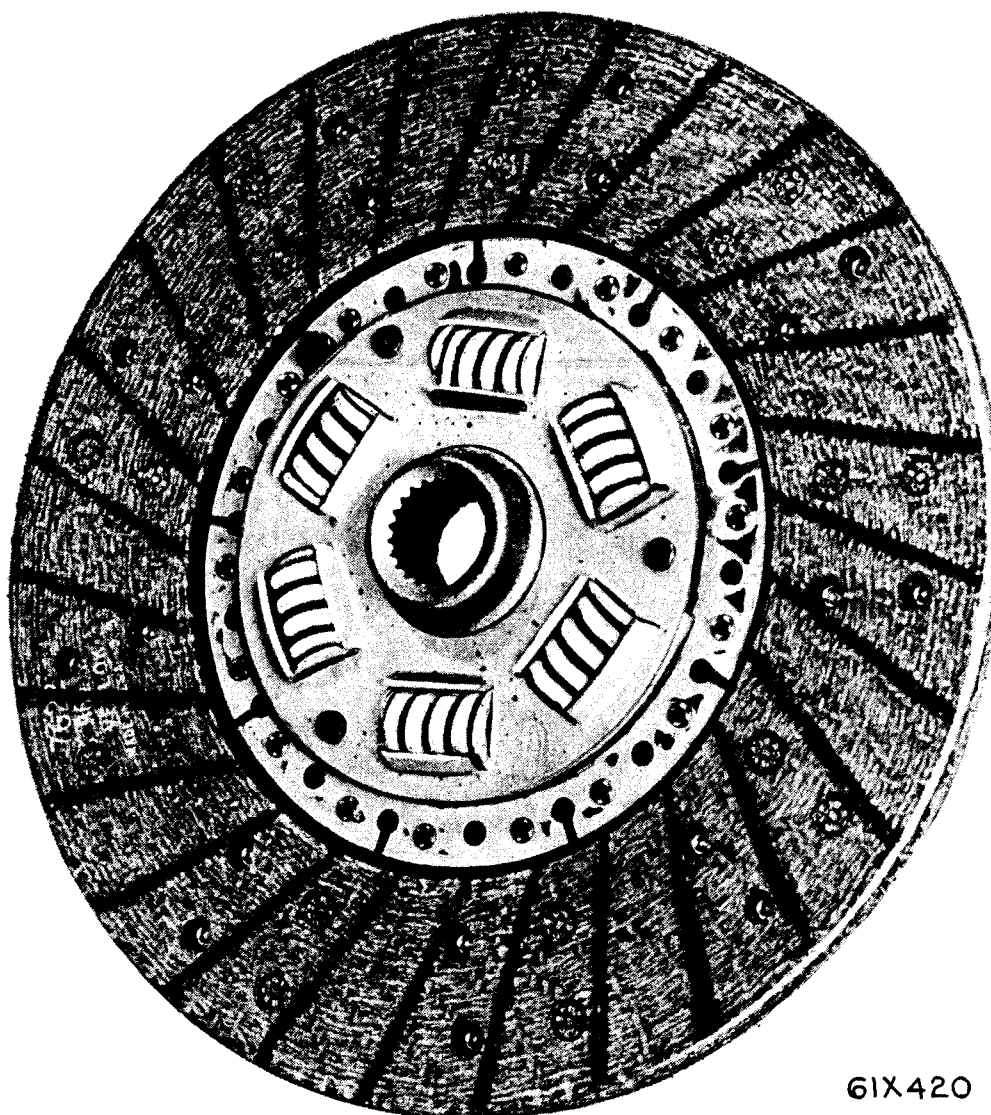


Figure 39 — Clutch Disc Assembly

mostat housing, for recirculation or return to the radiator, or heat exchanger.

THERMOSTAT

The thermostat as shown in Fig. 38 restricts water flow to the radiator until the water has reached a predetermined temperature, thereby permitting faster warm-up of the engine.

A by-pass passage and tube from the intake manifold on Models HT-361, and HT-413, provide circulation around the intake manifold carburetor mounting flange pad. On Industrial Units equipped with a Power Torque unit, an oil cooler is also connected to the cooling system.

Three drain cocks are provided for draining the cooling system, one in the radiator and one at each side of the cylinder block near the exhaust manifold outlet. All three must be open to drain the system completely.

CLUTCH (Fig. 39)

The type of clutch used is determined by the type of drive adaptation. On models equipped with an Industrial Torque Converter, the output shaft is attached to a flywheel which has the clutch assembly mounted on it. When the clutch is engaged, the clutch disc, which is splined to the transmission drive pinion, is clamped between the flywheel and the clutch pressure plate to transmit power to the transmission. Power flow through the clutch assembly is controlled by the clutch release fork and linkage to the clutch pedal or lever.

POWER TAKE-OFF (OPTIONAL EQUIPMENT)

The power take-off and clutch assembly (Fig. 40) used with some industrial engines is a heavy duty unit consisting of a three section dry disc clutch and a drive shaft enclosed in a special housing which is bolted to the engine by means of a flywheel housing. The clutch drive ring is attached to the engine flywheel and drives the pressure plate by means of internal gear teeth. When the clutch is engaged, the pressure plate is clamped between the discs, engaging the clutch body which is keyed to the drive shaft. The drive shaft is supported by a double row ball bearing at the front and by two tapered roller bearings at the rear of the housing. The clutch release lever controls the clutch release bearing through a clutch yoke which engages the clutch release bearing trunnion. Positive disengagement of the clutch mechanism is accomplished through a toggle arrangement acting in conjunction with the return springs. A threaded adjusting nut in the clutch provides a means of compensating for wear.

TRANSMISSION

The Chrysler 8-Cylinder Industrial Engines use one of the following

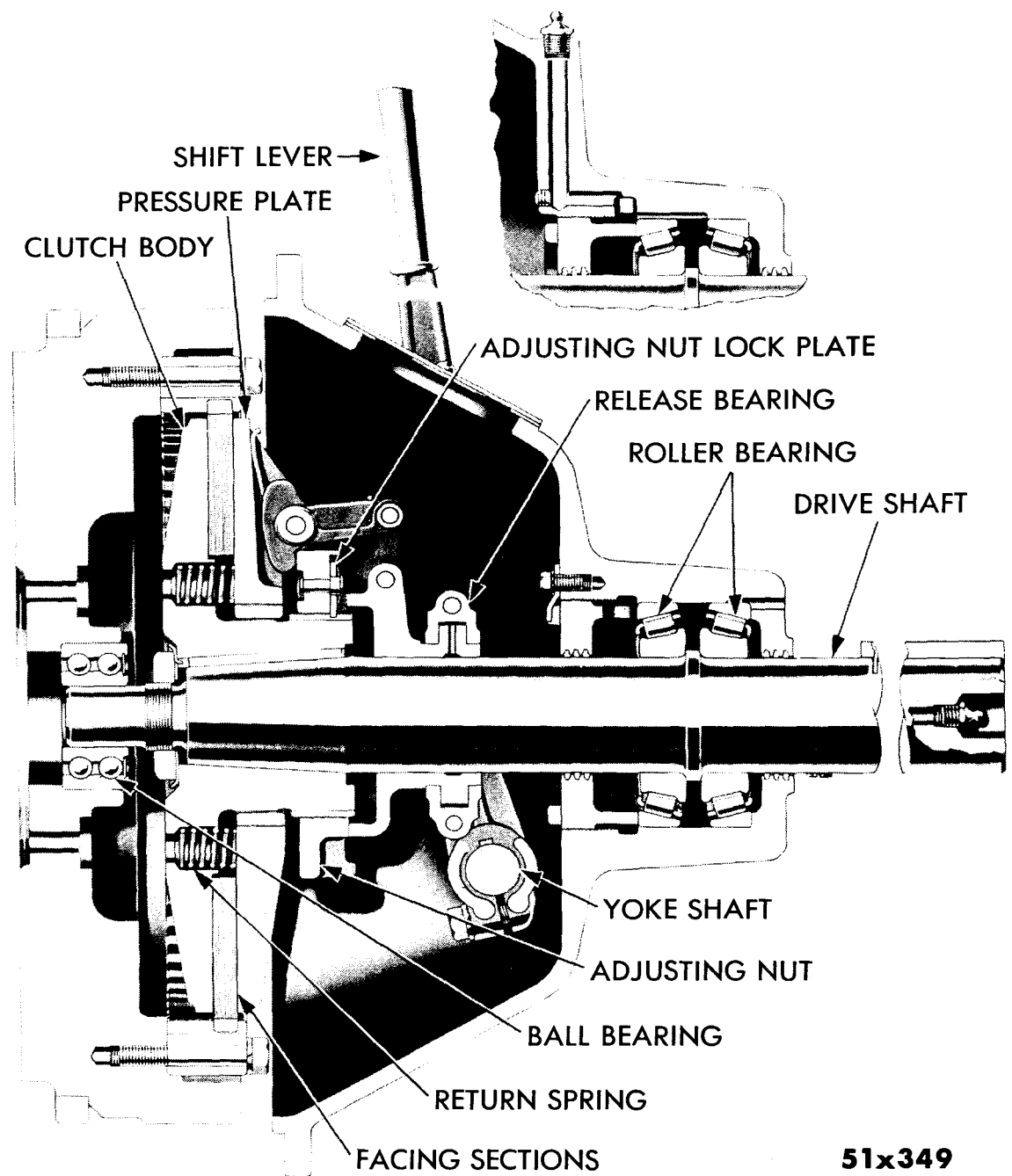
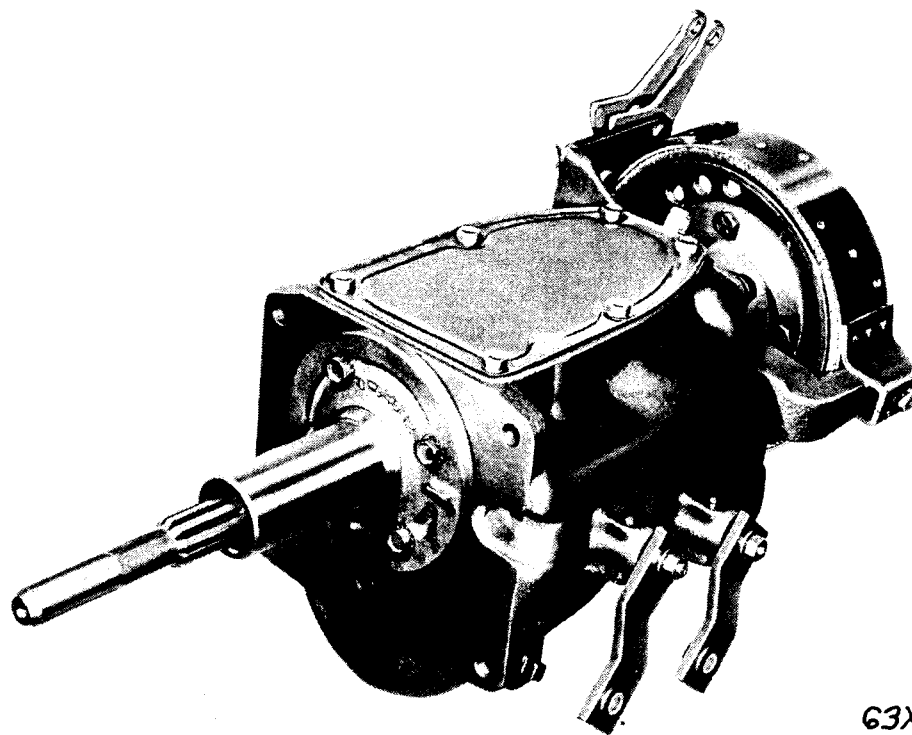
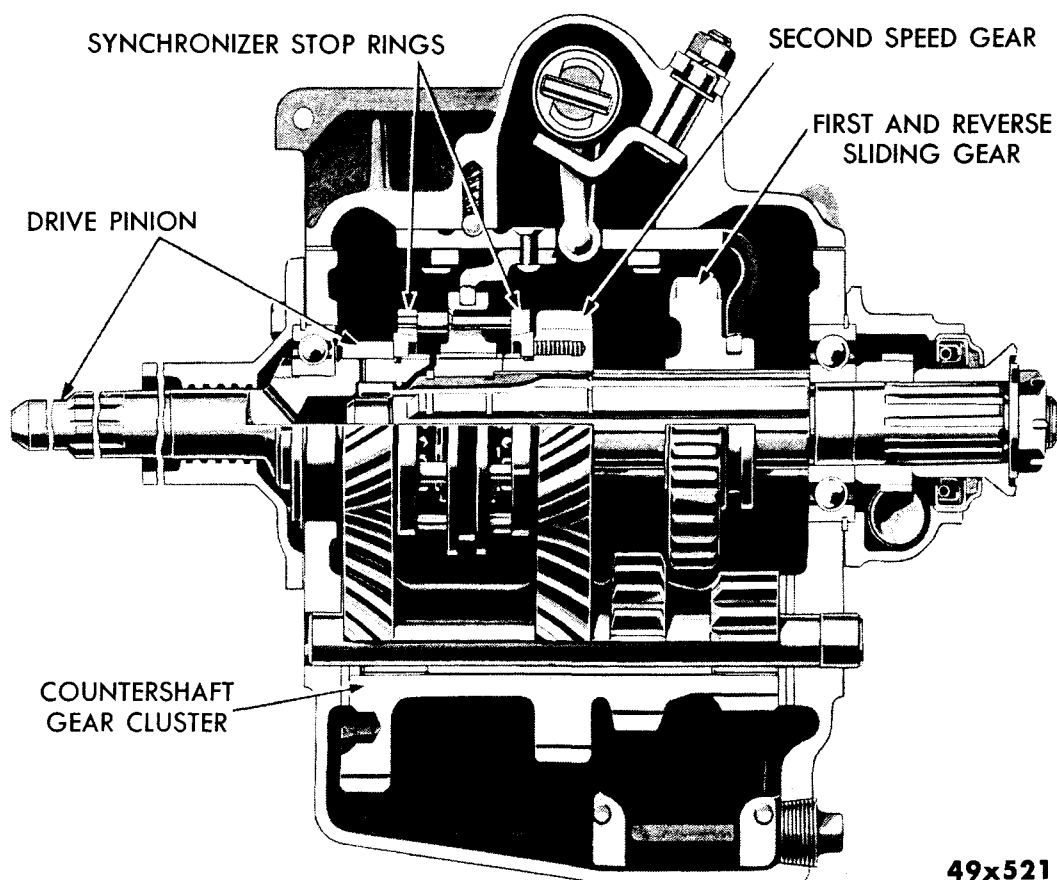


Figure 40 — Power Take-Off with Heavy Duty Clutch (Sectional)



63X983

Figure 41 — Transmission Assembly 3-Speed (Model A745)



49x521

Figure 42 — Transmission Assembly 3-Speed (Model T87E)

transmissions (Figs. 41, 42, 43 and 44) 3-Speed, 4-Speed, 5-Speed or Power Torque units.

Model A745 Transmission (3-Speed)

The three speed manual transmission is a synchromesh type with helically cut gears. The gear selection is accomplished by moving the shift lever through the "H" shift pattern. Gearshift operating levers are attached to the shafts mounted directly into bosses provided on the left side of the transmission case.

Model T87E Transmission (3-Speed Extra Heavy Duty)

The three speed extra heavy duty manual transmission is a synchro-

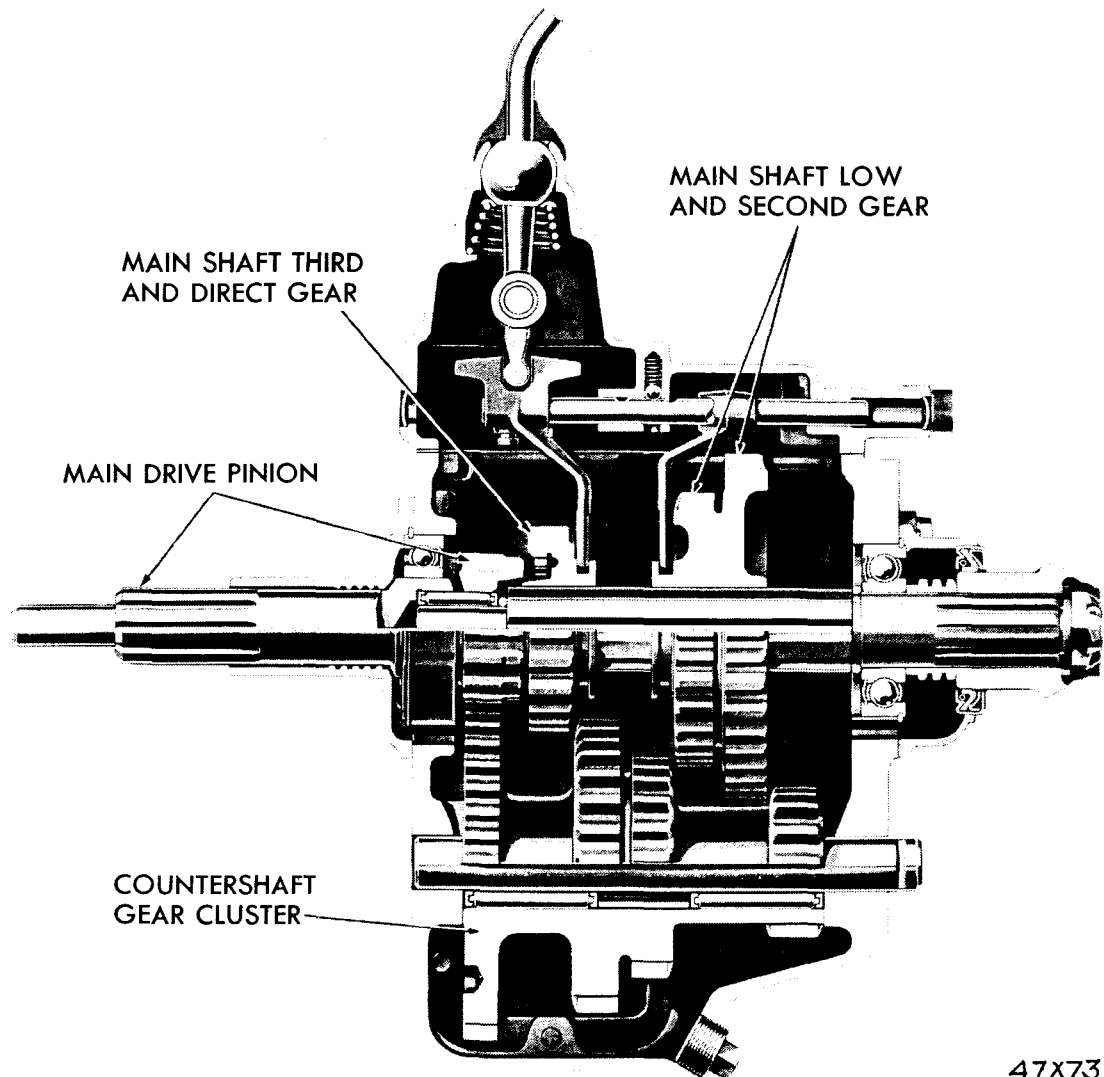


Figure 43 — Transmission Assembly 4-Speed (Model 420)

mesh type with helically cut gears. The gear selection is accomplished by moving the lever through the "H" shift pattern.

Model 420 Transmission (4-Speed)

The four speed manual transmission is a rugged exceptionally smooth easy shifting transmission. All of the gears are of the helical design except 1st and reverse which are spur type. The countershaft and all its gears are a single unit. The engagement of the 3rd and 4th gear is aided by pin type synchronizers. (Fig. 45)

Model 433D Transmission (4-Speed)

The four speed manual transmission is a modified version of the

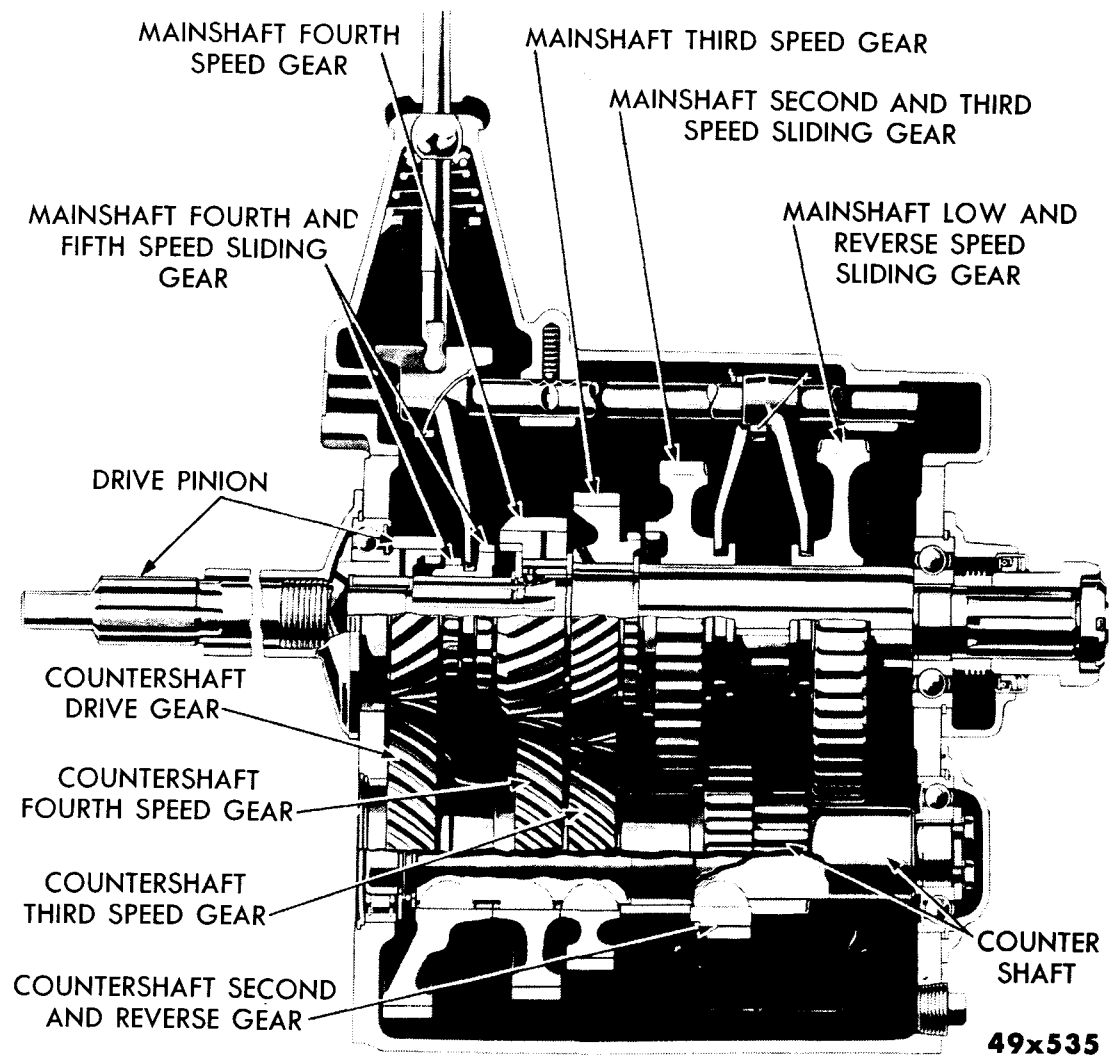
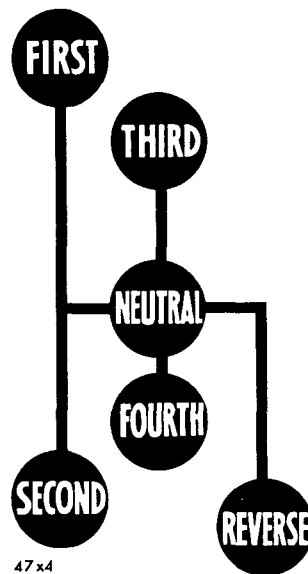


Figure 44 — Transmission Assembly 5-Speed (Model 540)



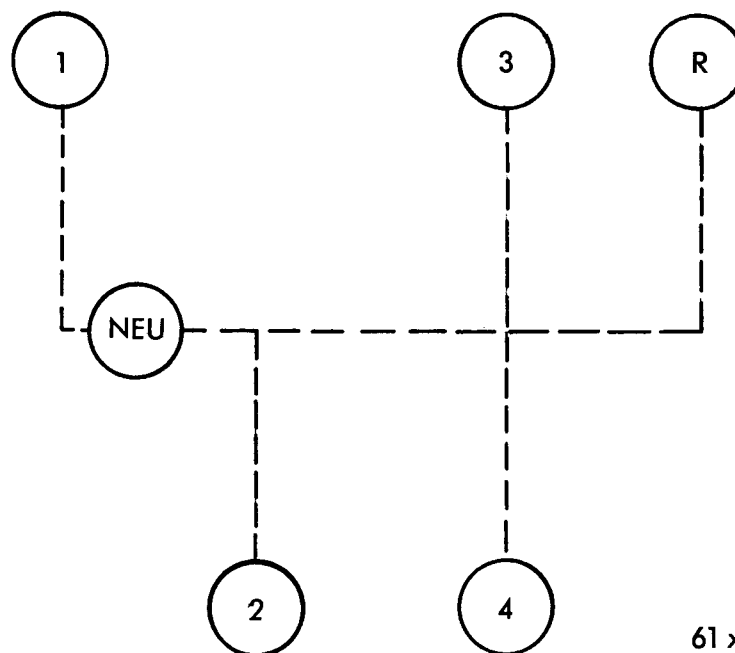
47 x 4

Figure 45 — Gearshift Lever Positions 4-Speed (Model 420)

Model 540 transmission. The Model 433D uses the same case as the Model 540 transmission, and the major difference is the 2nd speed gear has been excluded from the mainshaft assembly. The transmission cover remains the same as that used on Model 540 with the use of a stop for the 2nd speed position of the shift lever. (Fig. 46)

Model 540 Transmission (5-Speed)

The five speed manual transmission with high ratio first and reverse gears provides greater torque multiplication than is available with the



61 x 89

Figure 46 — Gearshift Pattern 4-Speed Transmission (Model 433D)

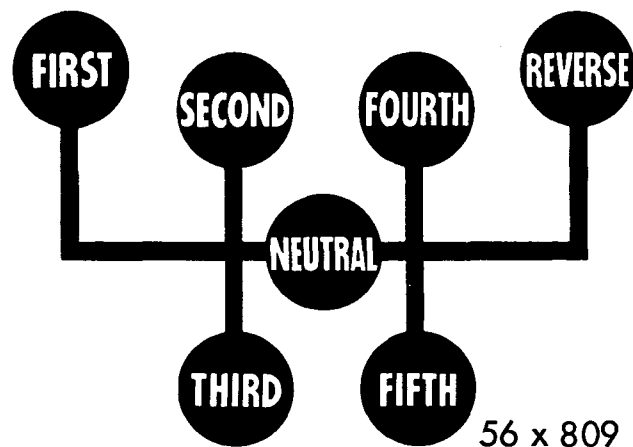


Figure 47 — Gearshift Lever Positions 5-Speed (Model 540)

four speed transmission. All of the gears are of the helical design except first and reverse which are the straight spur-type. (Fig. 47)

LOADFLITE TRANSMISSION (3-Speed Automatic)

The three speed automatic LoadFlite Transmission combines a torque converter with a fully automatic three speed planetary gear system. (Fig. 48)

The transmission is operated by a gearshift control unit consisting of five push buttons (Fig. 49) identified by R (Reverse), N (Neutral), D (Drive), 2 (Second) and 1 (Low).

In the drive range, the transmission shifts through all three ratios automatically. The shift points are determined by throttle opening and the unit speed.

The second position range is used to operate the transmission in the first two ranges only. This range is suitable for heavy or slow operation where the operator may desire part throttle only.

Power Torque (Optional Equipment)

The Chrysler "Power Torque" is offered in three versions and provides a compact, versatile and economical means of power take off on all industrial engines.

The three versions are:

- (1) An in-line PTO.
- (2) A right angle PTO.
- (3) Several transmission adaptations (Fig. 50) covering tower and remote shift manual transmissions.

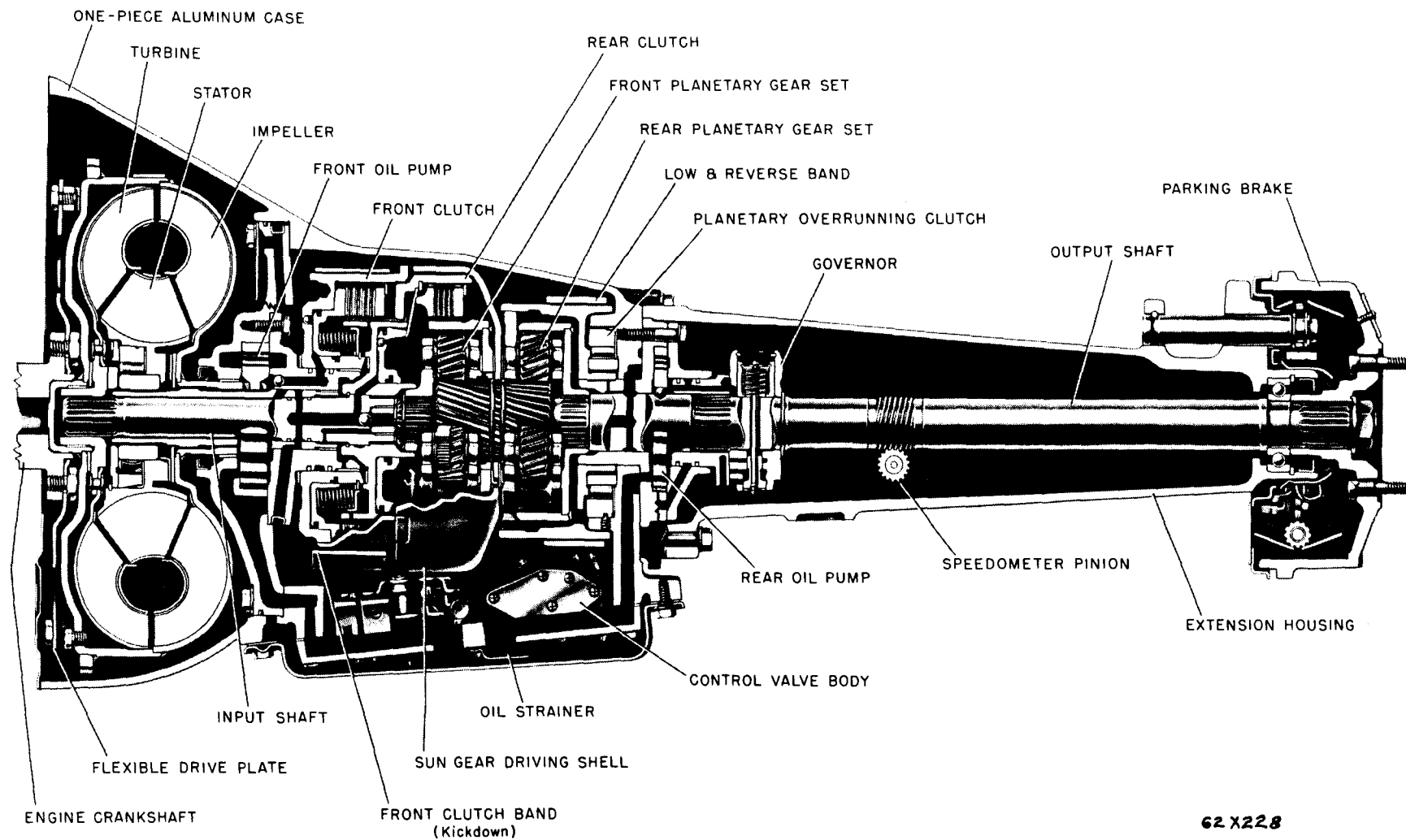


Figure 48 — Automatic Transmission 3-Speed (Model 727)

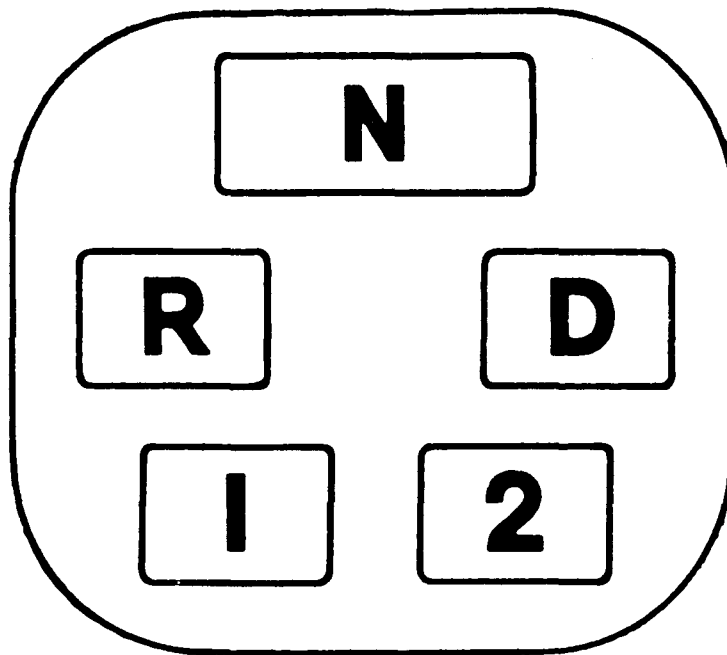


Figure 49 — Gearshift Control Unit

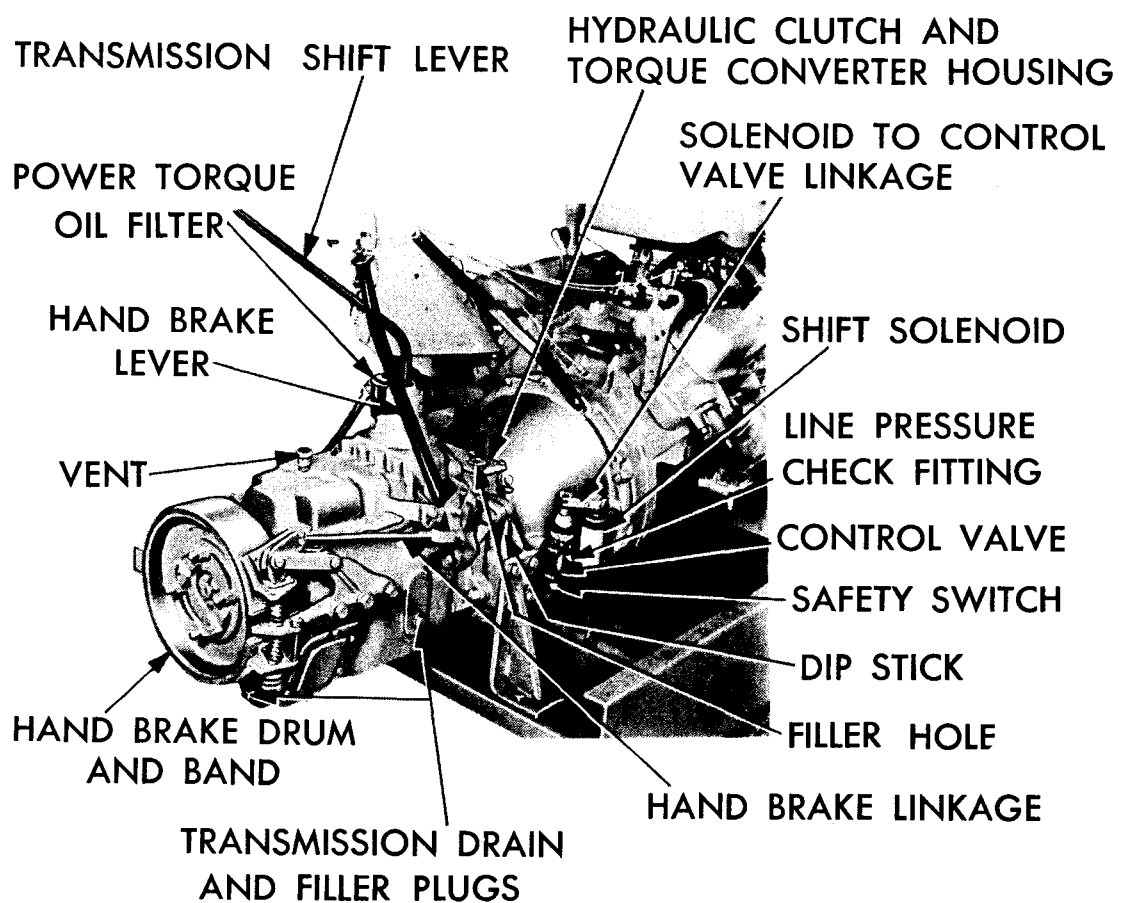


Figure 50 — Transmission Adaptation with Power Torque 62 x 767

Common component parts for all three versions are:

- (1) A integral torque converter housing and adapter plate.
- (2) A torque converter of 11 $\frac{3}{4}$ inch diameter with 2.20 stall ratio or a torque converter of 12 $\frac{1}{2}$ inch diameter with 2.26 stall ratio.
- (3) A hydraulic clutch housing and oil pan containing an oil pump, regulator, valve body, manual valve and neutral safety switch.
- (4) A wet type hydraulic clutch with four discs (8 surfaces).
- (5) An oil cooler.

Power Torque Control Valve

Positioned on the right side of the hydraulic clutch housing (facing the engine from the rear) is the electrically operated control valve.

The oil pan dip stick is located on the right side of the hydraulic clutch housing and on the left side of the hydraulic clutch housing is the combination breather vent cap and oil filler plug. There is an oil capacity of approximately 7.2 quarts "full" and Automatic Transmission Fluid Type "A" Suffix "A" is used.

The oil must be changed every 250 hours or 3 months of operation whichever occurs first for normal operation and every 200 hours or 2 months of operation, whichever occurs first for prolonged heavy duty operation in hot weather.

The line pressure should be checked periodically to obtain efficient service. The line pressure must be measured at 1500 input rpm with the fluid at normal temperature. The minimum pressure should be 100 psi; the maximum 120 psi. Most Power Torque units will measure 105 to 115 psi line pressure.

The mounting pads are common for all phases since they are incorporated on the hydraulic clutch housing.

Phase I — Straight In-Line PTO (Optional Equipment)

Along with the common component parts to all three phases, Phase I includes the splined "in-line" output shaft, adapter, output shaft bearing, oil shaft seal and companion yoke. Three yokes are available: Cleveland Yoke #555-1-229, Spicer Yoke #95188 and Spicer Yoke #SKU-108908. The straight line PTO output shaft bearing requires no special attention as it is lubricated with the transmission fluid from the Power Torque hydraulic clutch housing by means of oil splash and mist lubrication.

Phase II — Right Angle PTO (Optional Equipment)

The right angle PTO version contains two tapered roller bearings

which are assembled in an extension housing attached to the hydraulic clutch housing. The extension assembly supports the output shaft which has a 2¼ inch diameter shaft end with a ⅝ inch square keyway.

Lubrication is provided the two tapered roller bearings in the extension housing by means of a drilled passage in the output shaft depositing transmission fluid in the extension housing sump. An oil return hole in the back of the power unit hydraulic clutch housing maintains the required oil level in the extension housing so that the bottom of the two roller bearings are continuously rotating in oil.

The three speed automatic transmission combines a torque converter with a fully automatic 3-speed planetary gear system. The transmission is operated by a gearshift control unit consisting of five push buttons. (Fig. 49) The push buttons are identified by R (Reverse) N (Neutral), D (Drive), 2 (Second) and 1 (Low).

In the drive range, the transmission shifts through all three ratios automatically. Shift points are determined by throttle opening and the unit speed. The second position range is used to operate the transmission in the first two ranges only. This range is suitable for heavy or slow operation where the operator may desire part throttle only.

No special attention on the part of the operator is required to lubricate the right angle power take-off as oil is pumped to the extension housing and the proper oil level is automatically maintained.

Phase III — Transmission Adaptations (Optional Equipment)

The transmission versions consist of a modified transmission assembled to the hydraulic clutch housing by an adapter. The transmission contains a special input shaft that assembles to the hydraulic clutch. A tower shift and remote shift New Process Model No. 540-five speed manual transmissions are available as optional equipment.

These transmissions have their own independent lubricant supply and should be lubricated in accordance with the general lubrication recommendations given in this manual for transmissions under "General Lubrication".

OPERATING INSTRUCTIONS

PREPARATION OF A NEW ENGINE

Before placing a new or rebuilt engine in service, make a thorough inspection for evidence of damage or loose parts.

ENGINE OIL

See that the crankcase contains the correct amount of clean new SAE Engine Oil, conforming to the requirements of API Classification "For Service MS". After 25 hours of operation the crankcase should be drained and refilled with oil as recommended in the Lubrication Section.

COOLING SYSTEM

Fill the cooling system with water, using anti-freeze solution, if temperature requires it. In warm weather, the use of MOPAR Rust Resistor is recommended.

ENGINE ACCESSORIES

See that all points requiring lubrication are properly supplied. Check storage battery terminals to see that they are tight and clean. Check the electrolyte level in the battery.

ELECTRICAL CONNECTIONS

See that all electrical connections are tight and clean. Check each spark plug for tightness.

ATTACHING PARTS

See that all the nuts, bolts and screws that attach parts are secure. Tighten the cylinder head nuts with a torque wrench to 85 foot pounds torque, in sequence as shown in Figures 51 and 52 for Models H-318, HB-318 and HC-318, and 70 foot pounds torque on Models H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413 and HT-413.

PRESTARTING INSTRUCTIONS

When the engine is in daily use, inspect it daily and always before starting after a period of idleness.

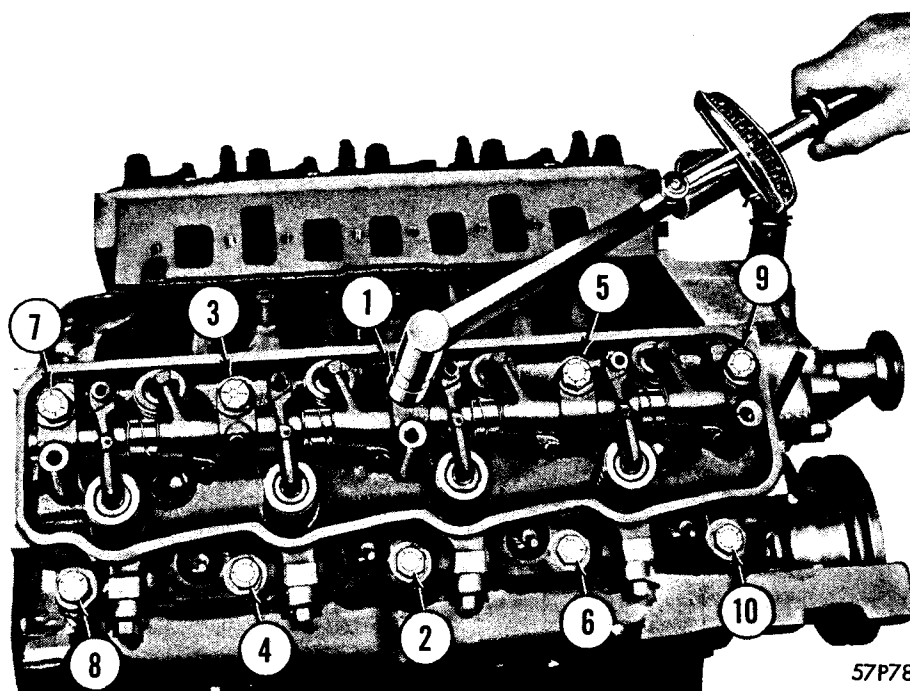


Figure 51 — Tightening Cylinder Head Bolts (Models H-318, HB-318, HC-318)

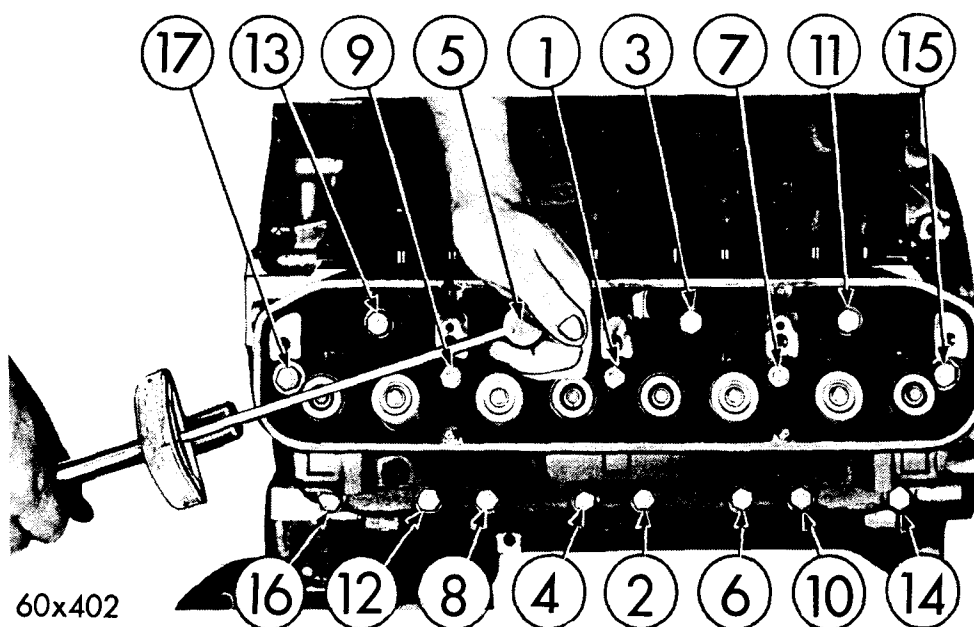


Figure 52 — Tightening Cylinder Head Bolts (Models H-361, HB-361, HC-361, HT-361, H-413, HB-413, HC-413, HC1-413, HT-413)

ENGINE OIL LEVEL

Inspect the oil level and add oil if required.

FUEL

Check the fuel supply.

COOLING SYSTEM

Inspect the cooling system and add water or anti-freeze as required.

TIPS ON ENGINE CARE

NEW OR REBUILT ENGINES

It is good practice not to operate a new or rebuilt engine at more than $\frac{3}{4}$ throttle for the first 8 or 10 hours. This low speed will permit the bearings to seat properly, and will allow the operator to familiarize himself with the controls and performance of the engine.

SAE 10-W Engine Oil for API Service "MS", should be used in the engine during the break-in period because the clearance between moving parts is very small and the light oil provides assured lubrication. Keep the oil at the proper level. After 25 hours of operation the crankcase may be drained and refilled with oil as recommended in the Lubrication Section.

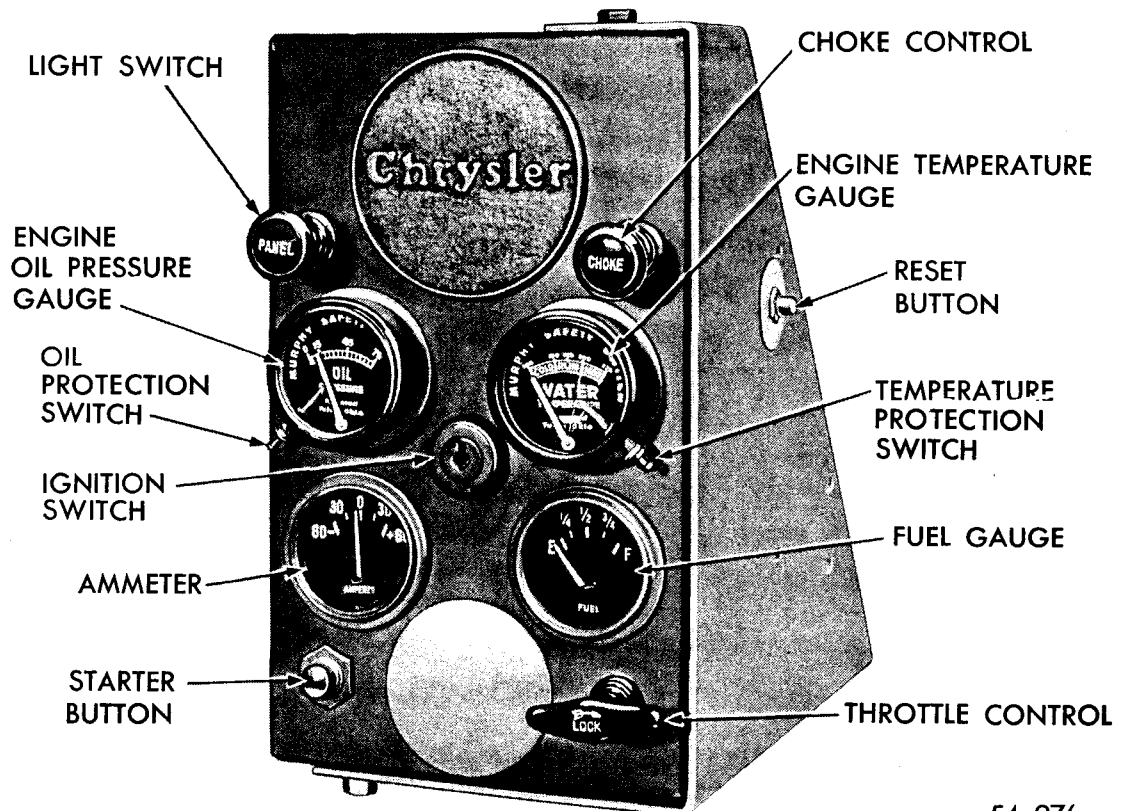


Figure 53 — Engine Mounted Instrument Panel

54x976

COLD ENGINES

When starting a cold engine (whether new or not), avoid unnecessary acceleration during the warm-up period. Keep the throttle at little more than idling speed until normal operating temperature is indicated on the temperature gauge. This simple precaution will assure long life of the engine and maximum efficiency of operation.

STARTING AND STOPPING THE ENGINE

STARTING

Open the throttle at $\frac{1}{3}$ opening. (Fig. 53) See that the clutch, gear shift lever or power take-off is in neutral position. Turn on the ignition switch and press the starting motor switch until the engine starts. Do not hold the starting motor switch in for periods longer than 15 seconds if the engine does not start promptly. After the engine starts, watch the oil pressure gauge. If the oil pressure gauge does not register after about 10 seconds, stop the engine and investigate.

OIL PRESSURE SAFETY SWITCH

On engines equipped with oil pressure safety switch, the manual starting button on the safety relay must be held in until the engine has started and generated sufficient oil pressure to lock-in the safety relay.

STOPPING

To stop the engine, first close the throttle and disengage the clutch. Allow the engine to run at idle speed for a few minutes, then with the throttle closed, turn off the ignition.

PRECAUTIONS

WARM-UP PERIOD

After starting a cold engine, operate it at a speed only slightly faster than idle (approximately 700 rpm) for a few minutes to allow the engine to reach normal operating temperature before placing it under full load. This warm-up period will permit oil to reach all bearing surfaces, thus reducing the possibility of scoring and premature wear of internal engine parts.

OIL PRESSURE

With the engine turning at approximately 2000 rpm and the water temperature at 160°F., the oil pressure should be from 45 to 65 pounds,

providing there is no abnormal escape of oil from some point. As bearings wear and the increased clearances permit more than the normal escape of oil, there will be a drop in pressure shown on the gauge, particularly at idling speed. A drop in oil pressure may also be the result of a plugged oil filter element (Full-Flow Type Filter).

WATER TEMPERATURE

A thermostat in the cylinder block retards the circulation of liquid in the cooling system until the liquid has reached a predetermined temperature, thereby permitting faster warm-up of the engine. Do not operate the engine with the thermostat removed, as this unit is essential to proper circulation and efficient engine performance. Without the thermostat, sludge will form in the crankcase because the low temperature of the engine permits condensation of fumes in crankcase. The thermostat cannot be repaired; if it fails to operate properly, replace the unit. When installing a thermostat, position it so that the thin bridges which divide the openings, face to the front and rear of engine (Figs. 54 and 55). When operating in hot climates, the maximum reading of the temperature gauge should not exceed 100°F. above the prevailing atmospheric temperature or not to exceed 210°F.

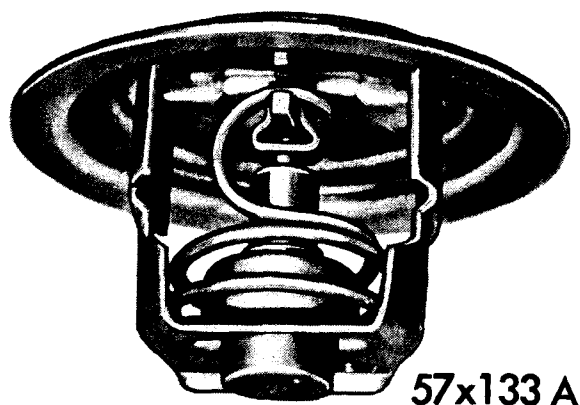


Figure 54 — Pellet Type Thermostat

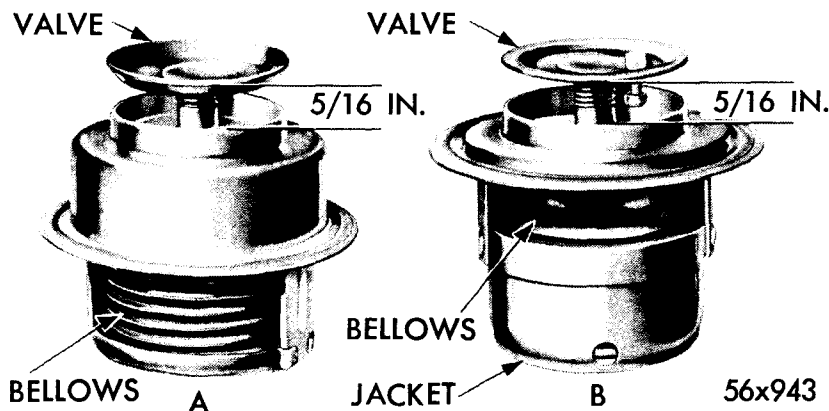


Figure 55 — Bellows Type Thermostat

AIR CLEANERS

Remove and service the carburetor air cleaner, oil filler pipe air cleaner and crankcase ventilator outlet pipe air cleaner, if so equipped, every 50 hours or less, depending on the severity of working conditions. Refer to the lubrication recommendations for servicing the above units.

IGNITION SYSTEM

Keep the units of the ignition system clean and the distributor properly adjusted.

FUEL SYSTEM

Keep the fuel tank, lines and filters clean. Always use a good grade of fuel.

COOLING SYSTEM

Do not fill the cooling system when the engine is overheated. Allow the engine to cool before adding liquid, in order to prevent cracking the cylinder block or cylinder heads. Use a good grade of anti-freeze during cold weather, and MOPAR Rust Resistor during warm weather.

POWER TAKE-OFF AND CLUTCH ASSEMBLY

On units equipped with the Power Take-Off and Clutch Assembly, avoid unnecessary use of the shifting lever. Frequent engagement and disengagement of the clutch causes rapid wear of clutch facings, necessitating frequent adjustment and replacement of parts. Do not attempt to engage or disengage the clutch while the engine is accelerated. Do not operate the unit when the clutch is slipping. See Adjustment Section.

TROUBLE SHOOTING

A good rule to follow when trouble shooting is to make only one adjustment at a time. Locate the cause of failure or irregular operation by the process of elimination.

CAUTION: Before making any electrical tests, air out the engine compartment thoroughly to remove all inflammable fumes.

STARTER WILL NOT TURN ENGINE

Loose or corroded Battery Terminals—Clean terminals and clamps, replace if necessary. Tighten clamps securely. Apply a light film of vaseline to the battery terminals, after the clamps are tightened.

Battery not Fully Charged — Check battery specific gravity. Full