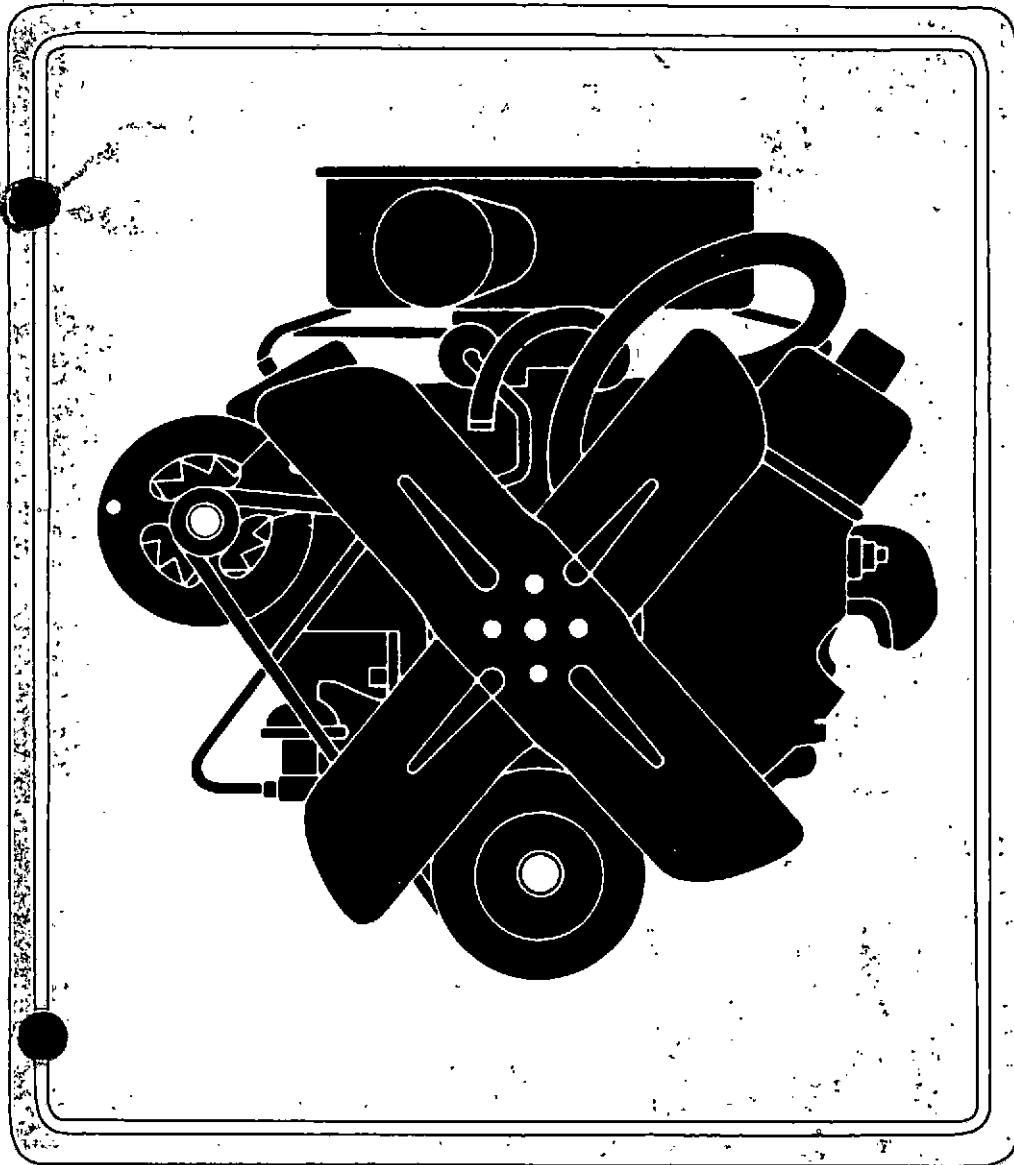


# Chrysler Industrial Power

## Operating Manual 318/360 Cu. Inch



9/80

81-770-9550

# CONTENTS

	Page
Adjustments .....	61
Construction .....	5
Description .....	2
Forward .....	1
Lubrication .....	51
Maintenance Schedules .....	44
Operating Instructions .....	75
Preparation for Storage .....	75
Specifications .....	79
Trouble Shooting .....	40
Tune-Up Specifications .....	78

## IMPORTANT

For your convenience, fill in the information indicated 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 .....

# FOREWORD

This Operator's Manual is published as a guide and reference to assist the Owner in obtaining from the new Chrysler Industrial Engines, Models LH-318, LH-360, the power, performance and dependability built into all Chrysler 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 Distributors 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 satisfaction.

For service, diagnosis or overhaul, refer to appropriate SERVICE OR MAINTENANCE MANUAL.

## 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 name plate is attached to the engine showing the model, type, and serial number of the engine.

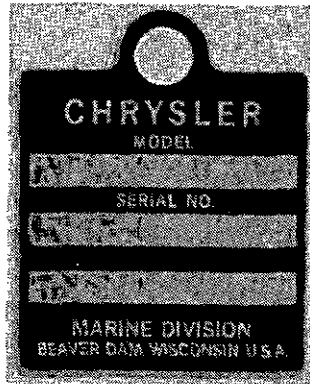


Figure 1 — Engine Identification Name Plate

# DESCRIPTION

## GENERAL DIFFERENCES AMONG MODELS:

Chrysler 8-cylinder Industrial Engines, Models LH318 and LH360 (Figures 2 and 3), are supplied in various types of powering special 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.

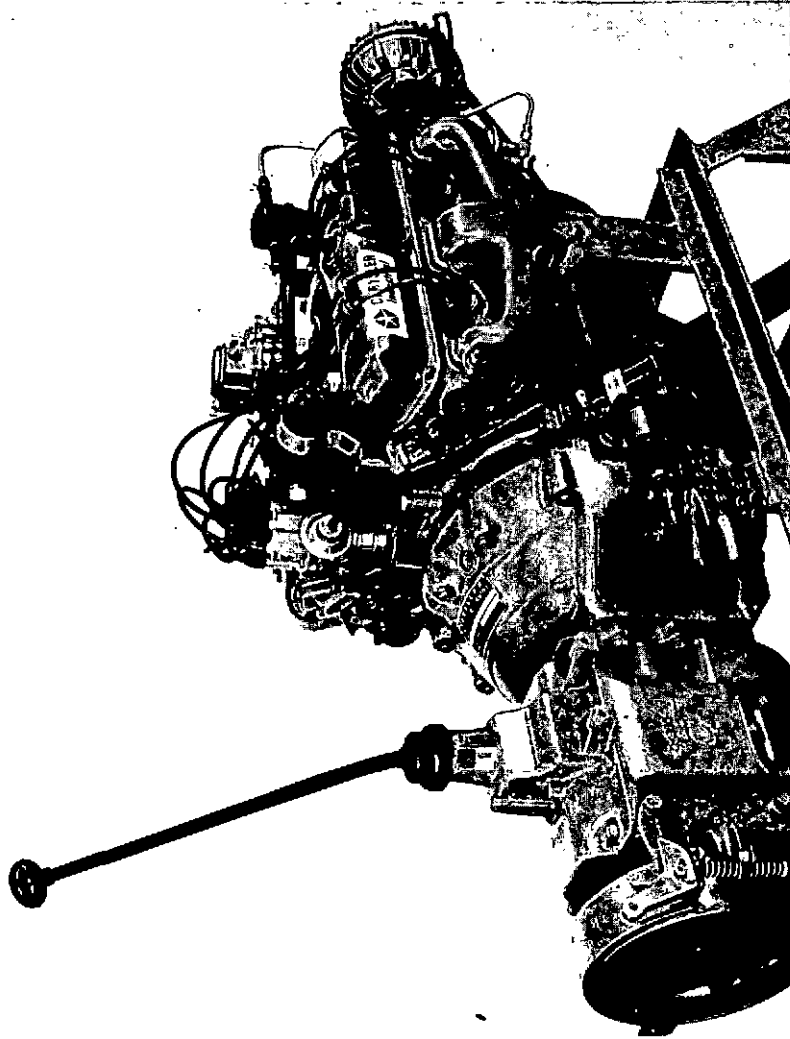


Figure 2 — Chrysler 8-Cylinder Industrial Engine

In order to identify the service parts requirements or where various accessories are required for different adaptations, such as the 3, 4, or 5-speed Transmissions, or Power Take-Off, a separate model and type number is designated for each engine, such as Model LH318-7112 or LH360-9144. Some engines are identified by model and part number. This is done so that your engine can be identified in determining the service parts requirements or where additional accessories are required.

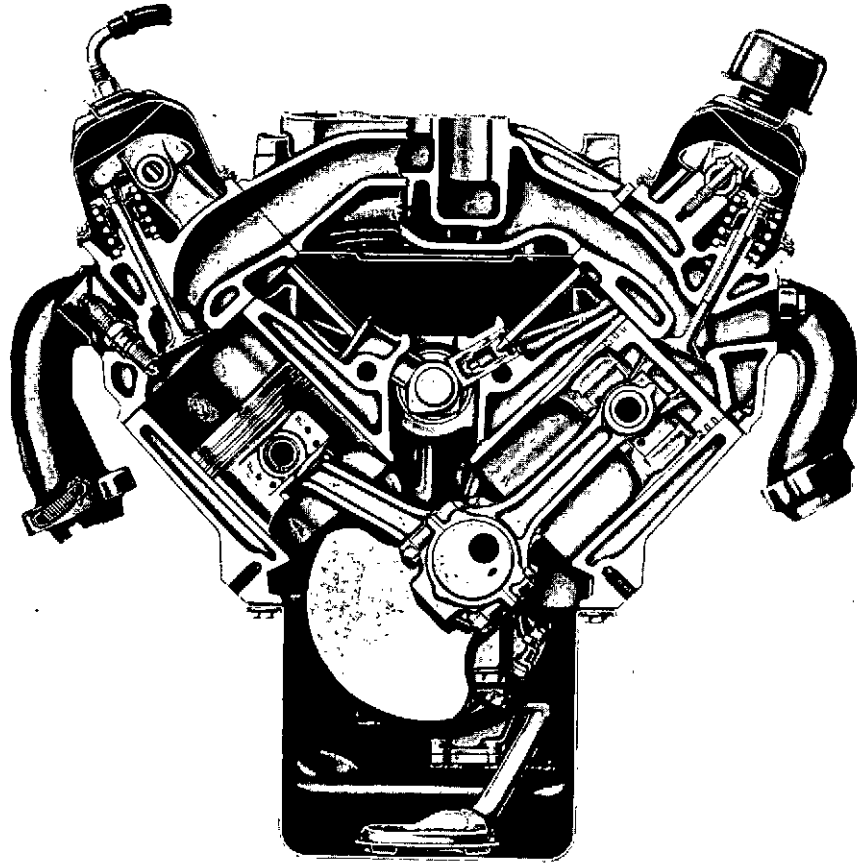


Figure 3 — Chrysler 8-Cylinder Industrial Engine  
(Sectional View)

# CONSTRUCTION

The Chrysler Industrial Engines, as shown in Figure 3, 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. LH indicates medium 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 some Models and by a roller chain on others.

The camshaft provides adequate valve overlap for deep breathing past the intake valves.

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

Hydraulic tappets are used on Models LH318 and LH360 and require no adjustment.

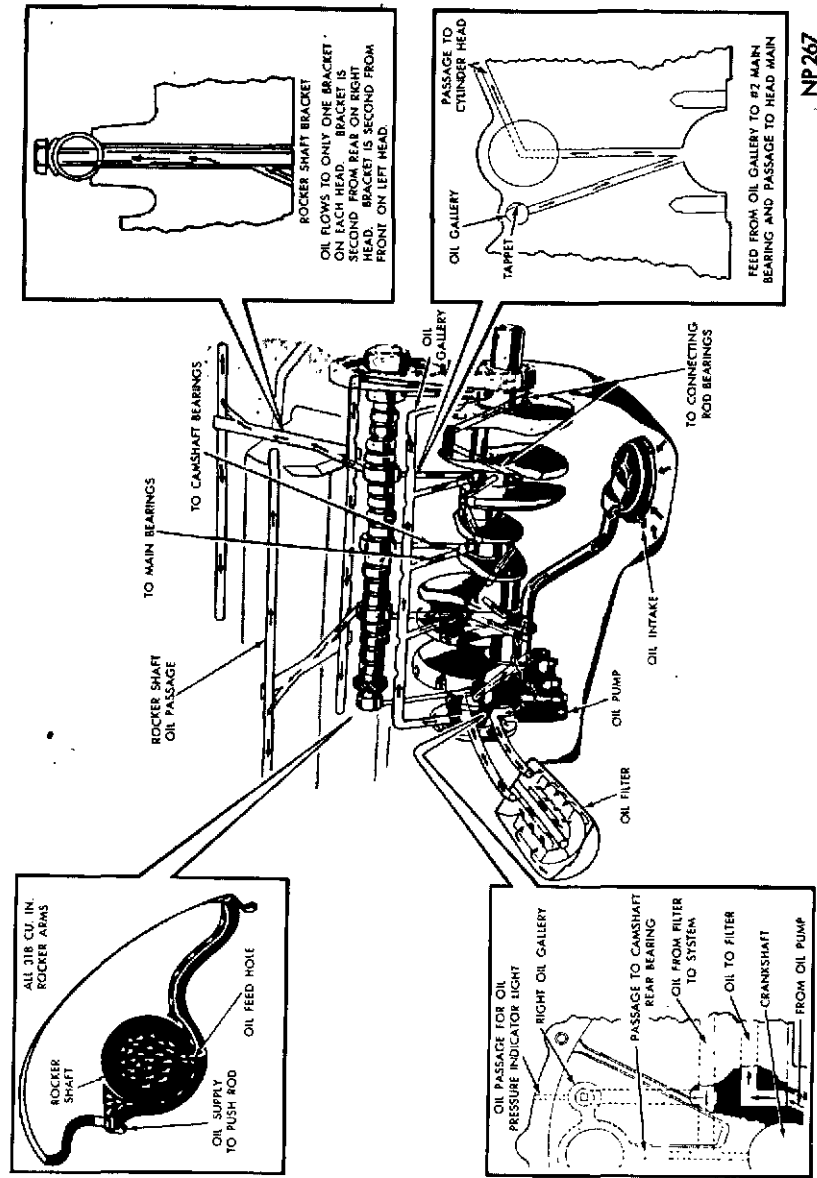
All connecting rod bearings and the main bearings have precision removable type bearing shells.

## 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. 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



NP 267

Figure 4 — Engine Oiling System

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 LH318 and LH360 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 4.

#### **EXHAUST VALVES:**

One of the outstanding features of the Chrysler eight-cylinder industrial engine is induction hardened exhaust valve seats which are standard.

#### **EXHAUST VALVE ROTATORS:**

Medium duty model industrial engines are equipped with exhaust valve rotators, either rotocoil or rotocap type to provide positive rotation of the exhaust valves each time they open. Their purpose is to prolong the life of exhaust valves. Some dry fuel engines do not use this feature.

The rotators are installed on the valve stems in place of the conventional valve spring retainers (Figure 5, Typical).

When rotators are used on the exhaust valves, special valve springs are used, which are not interchangeable with intake valve springs. Refer to appropriate parts list.

#### **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

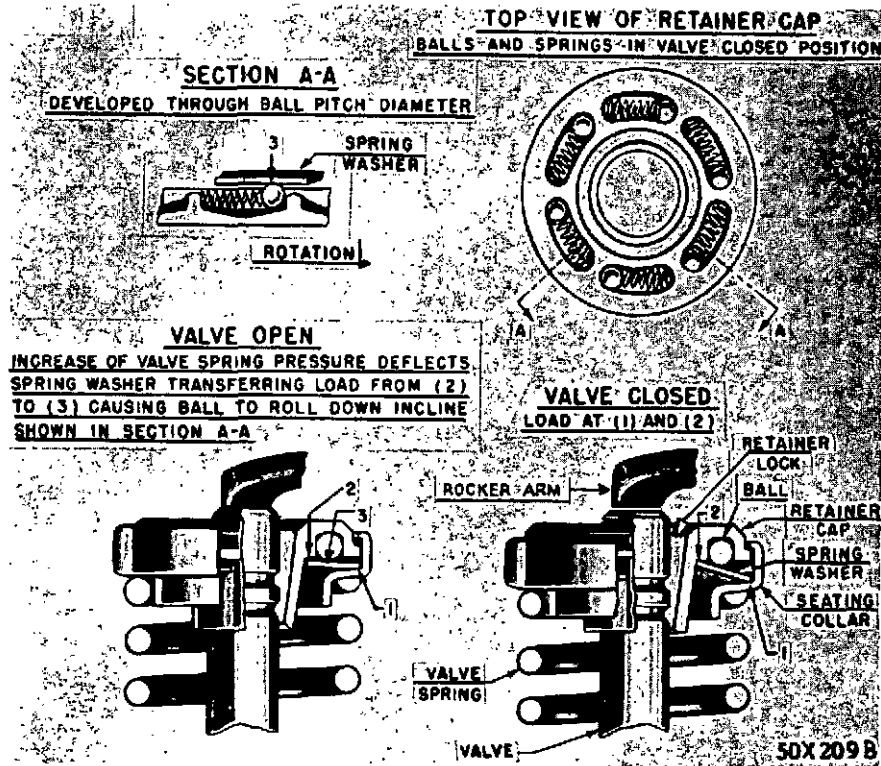


Figure 5 — Exhaust Valve Spring Retainer Assembly Rotators  
(Schematic View)

fuel into the carburetor, where it is atomized and mixed with air and drawn through the manifold and valves into the combustion chamber.

Typical carburetors shown in Figures 6, 7, and 8, 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 fuel in the float chambers at all times and under all normal con-

ditions 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 usually 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".

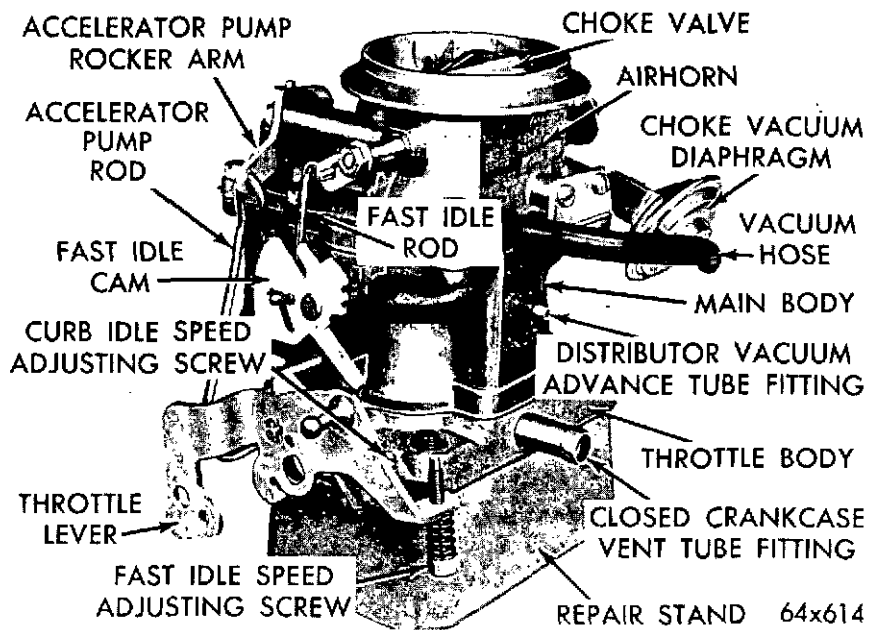
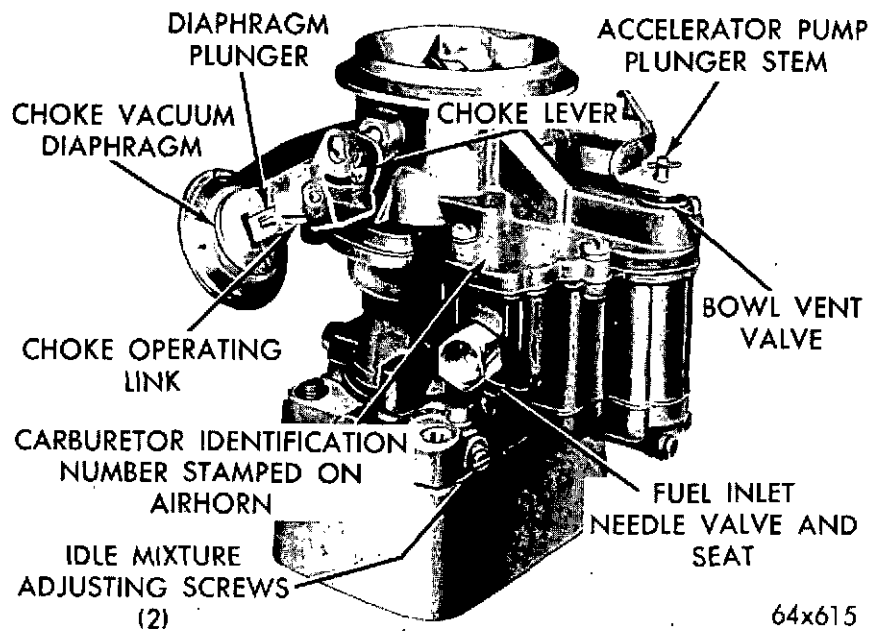


Figure 6 - Carburetor Assembly (WW3-243)

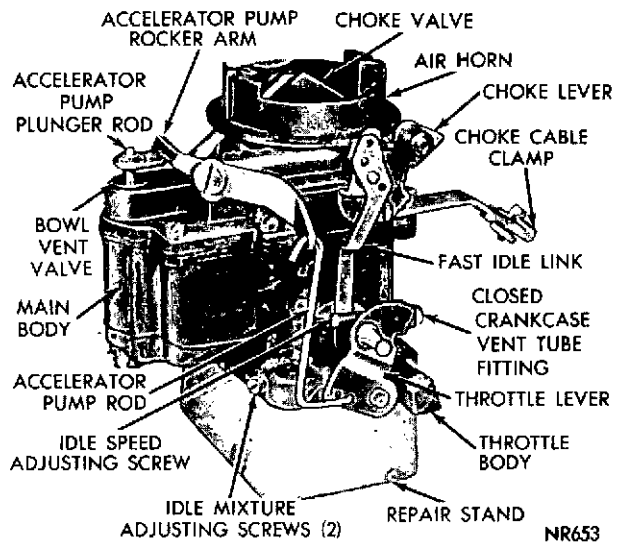


Figure 7 – Carburetor Assembly (WW3-283)

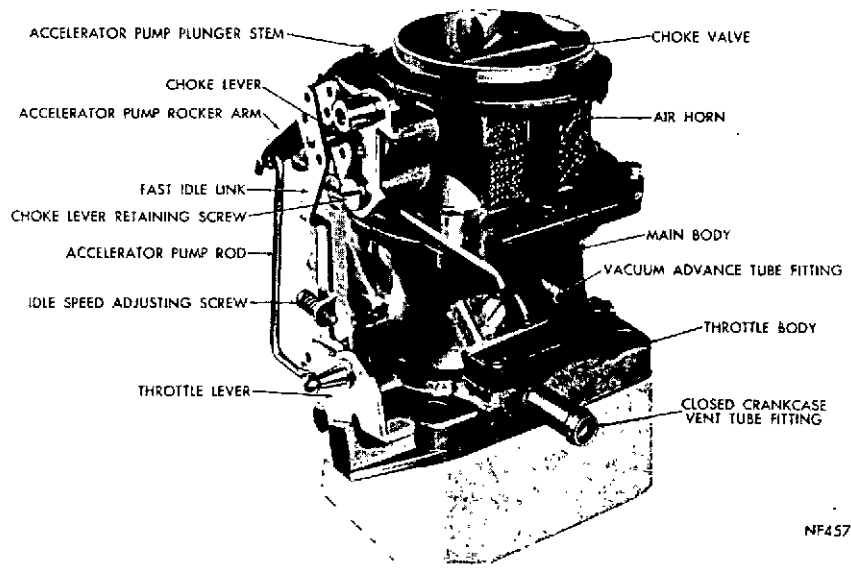


Figure 8 – Carburetor Assembly (WW3-226A)

of the 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 by-pass 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 "RE-OPENS", thus permitting fuel from the float chamber to enter and refill the accelerating pump cylinder.

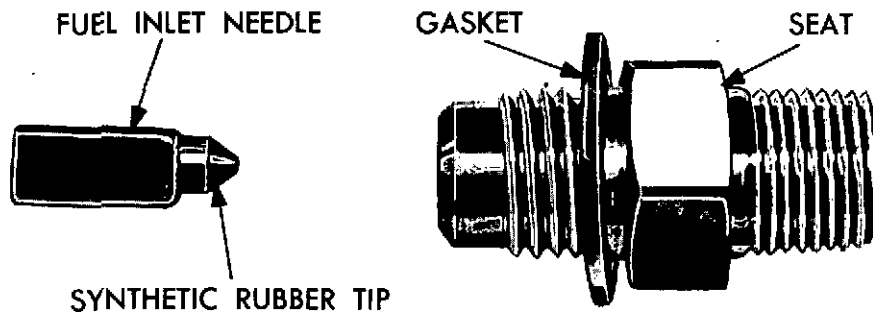
#### **SYNTHETIC RUBBER-TIPPED FUEL INLET NEEDLE:**

The WW3 Series carburetors are equipped with new synthetic rubber-tipped fuel inlet needles (Figure 9). 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.

#### **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



61x201

Figure 9 — Synthetic Rubber-Tipped Needle, Seat and Gasket  
Used on Carburetors (WW3)

## GOVERNORS

### MECHANICAL GOVERNORS:

Some engines are equipped with a mechanical type, gear-driven or belt 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. 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 (Figure 10).

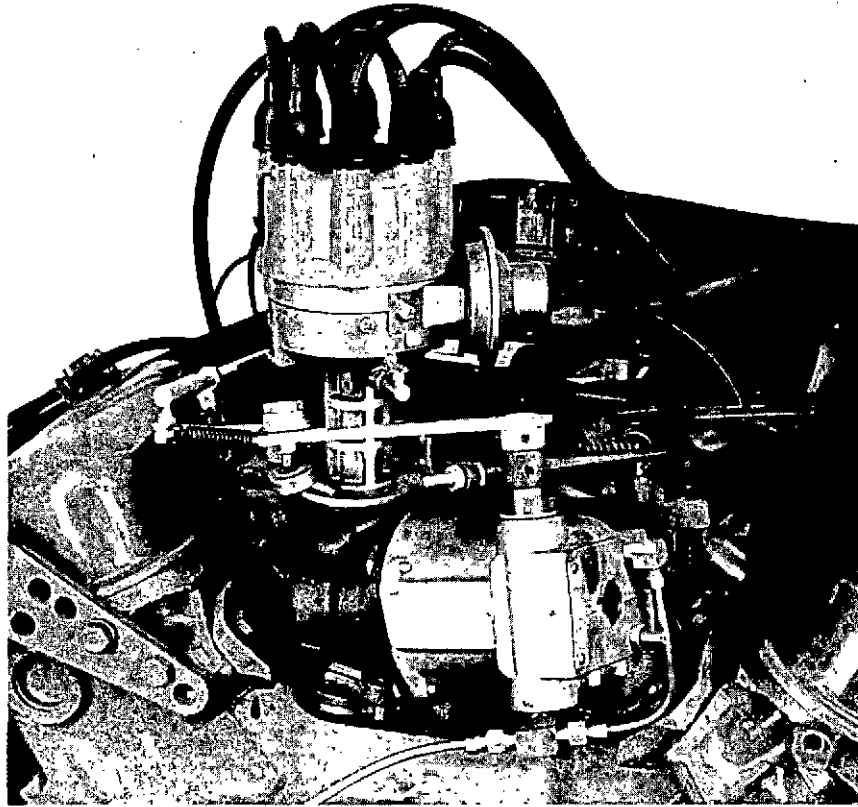


Figure 10 — Pierce Mechanical Gear-Driven Governor

**VELOCITY TYPE GOVERNOR:**

A typical velocity type governor (Figure 11), 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.

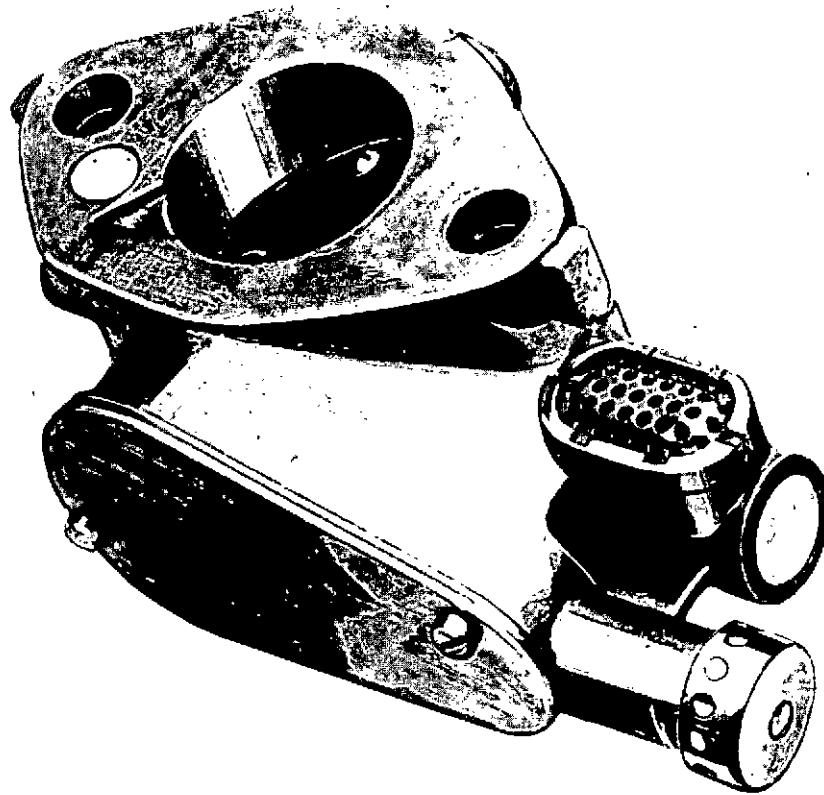


Figure 11 — Velocity Type Governor

**ELECTRICAL SYSTEM:**

The electrical system includes an alternator, voltage regulator, starting motor, starting motor solenoid, ignition distributor, ignition coil, ballast resistor, spark plugs together with the necessary cables, connecting wires, ammeter and switches (Figure 17 or 18). The electronic ignition system would include an electronic control unit.

**ALTERNATOR:**

The alternator (Figure 12) 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.

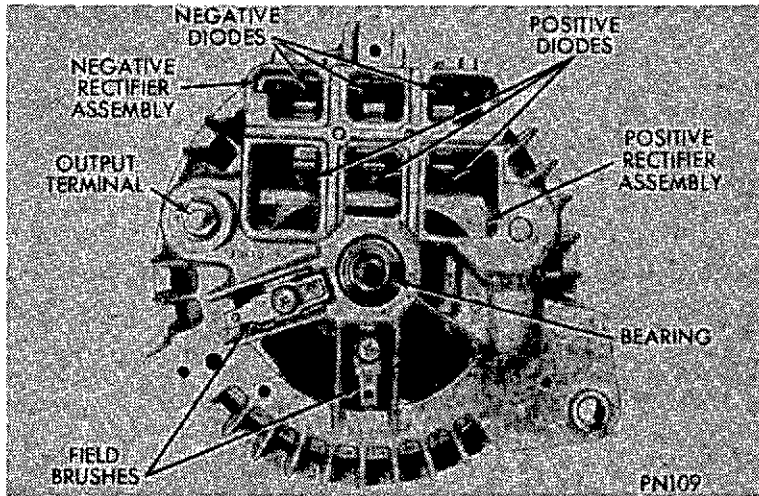


Figure 12 — Chrysler Alternator Assembly

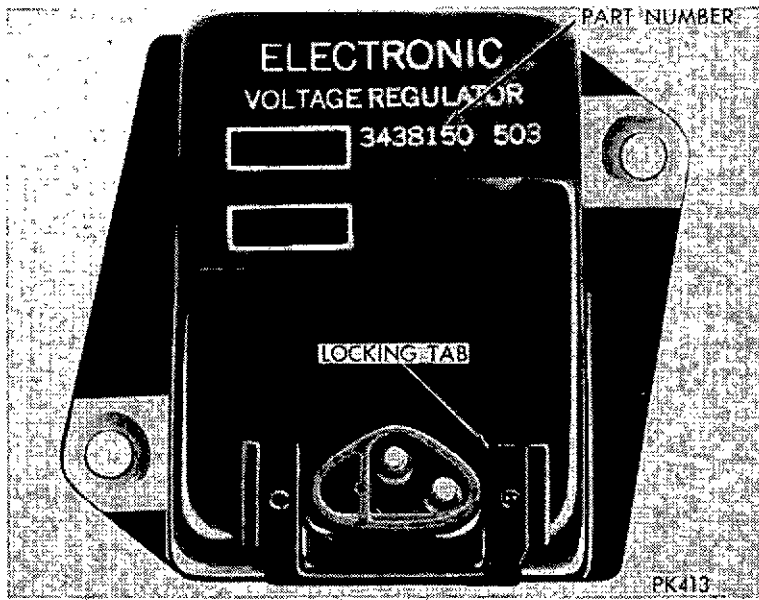


Figure 13 — Voltage Regulator

A regulator (Figure 13) limits the direct current voltage output. The 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.

**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:** Reserving the polarity on an alternator system will immediately burn out the wiring harness and may possibly damage the alternator. (See Schematic Wiring Diagram - Figure 17 or 18.

#### **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 (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.

#### **ELECTRONIC IGNITION SYSTEM:**

Consists of a distributor especially built for the electronic system incorporating a reluctor and a pick up coil in place of the conventional breaker points.

Additionally the electronic system utilizes a dual ballast resistor in conjunction with the Electronic Control Unit.

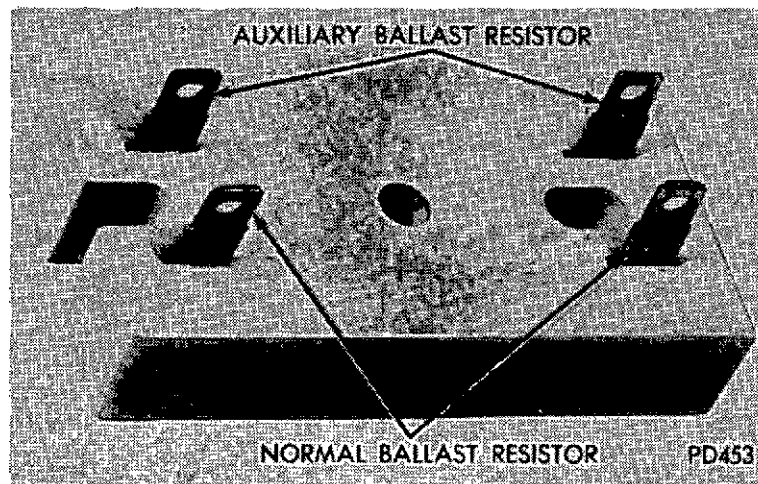


Figure 14 — Dual Ballast Resistor

Two circuits are used to operate the circuitry of the control unit. These are the auxiliary ballast circuit which uses the 5 ohm section of the dual ballast resistor and the control unit feed circuit.

The pick up circuit is used to sense the proper timing for the control unit switching transistor.

The reluctor rotating with the distributor shaft produces a voltage pulse in the magnetic pickup each time a spark plug should be fired. This pulse is transmitted through the pickup coil to the power switching transistor in the control unit and causes the transistor to interrupt the current flow through the primary circuit. This break in the primary circuit induces a high voltage in the secondary coil circuit and fires a spark plug.

The length of time that the switching transistor allows the flow of current in the primary circuit is determined by the electronic circuitry in the control unit.

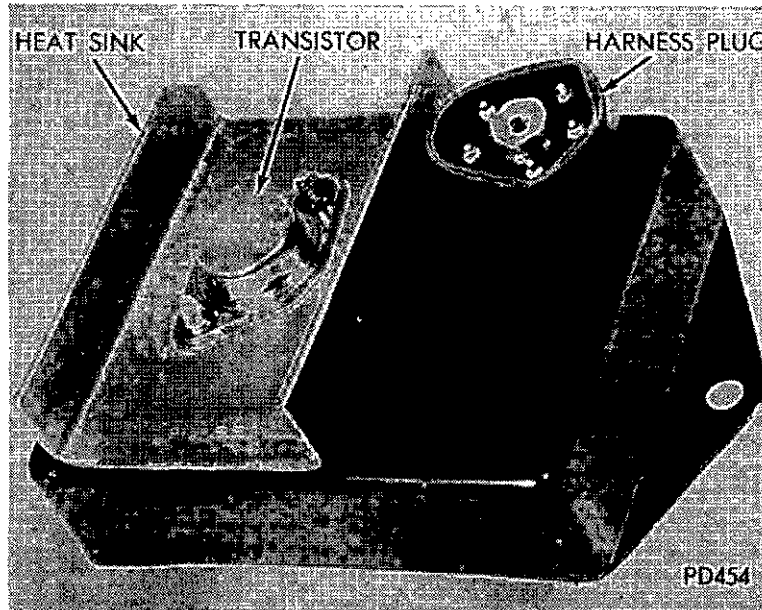


Figure 15 — Electronic Control Unit

THIS DETERMINES "DWELL". DWELL IS NOT ADJUSTABLE. THERE IS NO MEANS PROVIDED TO CHANGE IT BECAUSE CHANGES ARE NOT NECESSARY.

THE READING OBTAINED WITH A DWELL METER HAS NO SIGNIFICANCE IN DIAGNOSING OR SERVICING THE IGNITION SYSTEM. SINCE DWELL AFFECTS IGNITION TIMING, PERIODIC CHECKS OF TIMING BECOME UNNECESSARY AFTER BASIC IGNITION TIMING IS SET.

Ignition maintenance is reduced to inspection of the distributor cap, rotor, wiring, and the cleaning and changing of spark plugs as needed.

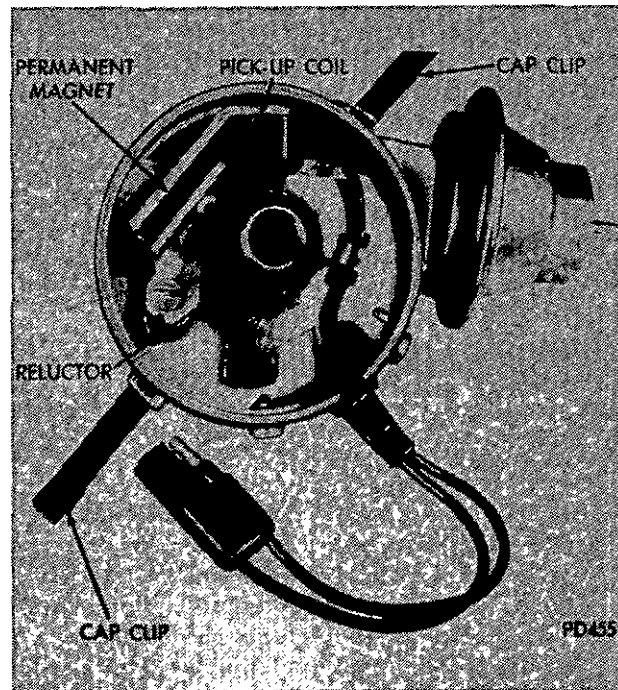


Figure 16 — Electronic Distributor

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:**

Engine Models	Spark Plugs)	MO-PAR
LH-318	N11Y or RN11Y	64PR
LH-360	N12Y or RN12Y	65PR

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 Figure 19, 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

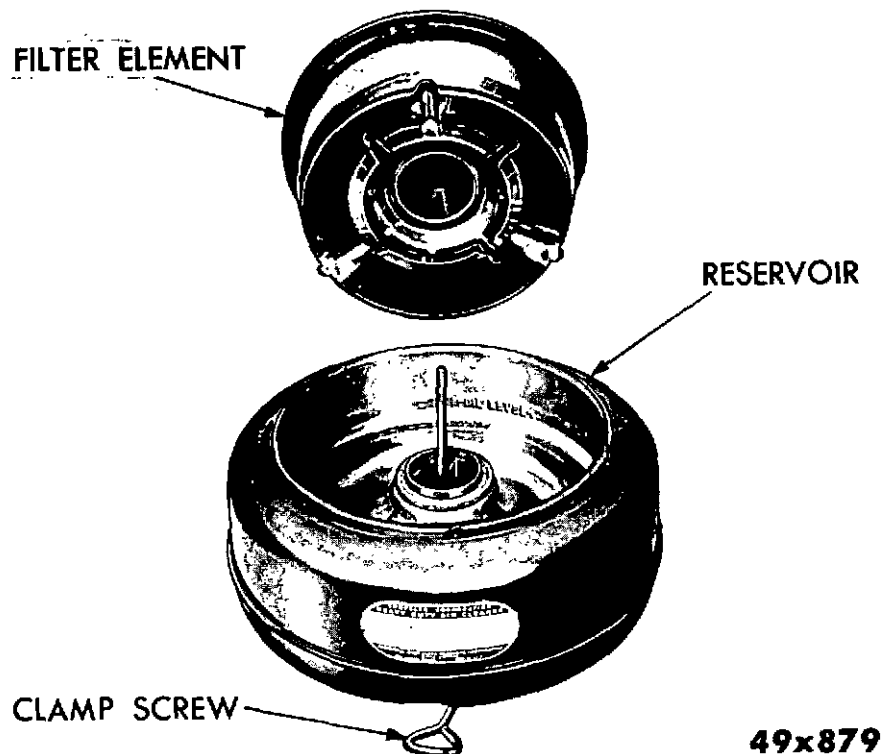


Figure 19 — Carburetor Air Cleaner (Oil Bath Type)

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: SAE 10W30.

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**

The filter element should be cleaned every 50 hours under normal service conditions (Figure 20).

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.

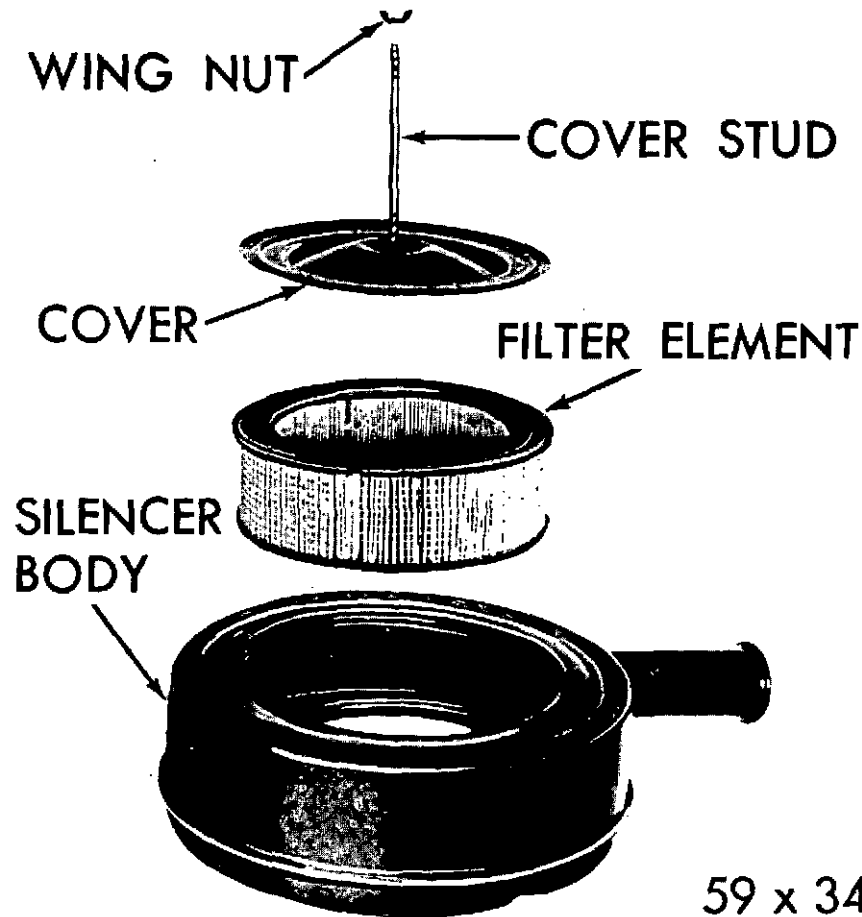


Figure 20 — Carburetor Air Cleaner (Dry Type)

**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 a heavy duty type air cleaner be used.

**CRANKCASE VENTILATION SYSTEMS:**

All industrial engines are equipped with a closed crankcase ventilation system, (Fig. 21) consisting of a crankcase ventilator valve mounted on the cylinder head cover with a hose extending from the valve to the base of the carburetor and a closed engine oil crankcase inlet air cleaner with a hose connecting it to the carburetor air cleaner housing to provide the source of air for the system.

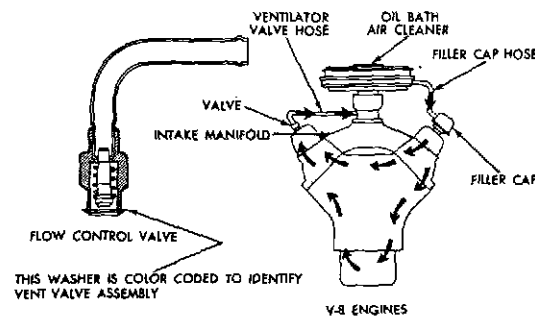


Figure 21 — Fully Closed Crankcase Ventilation System

**FREQUENCY OF SERVICE:**

All crankcase ventilation systems must be kept clean to maintain good engine performance and durability. Periodic service is required to remove combustion products from the valve, hoses, and carburetor passages. The ventilation system should be inspected and serviced as follows:

**Every 100 hours:**

Clean crankcase inlet air cleaner  
Inspect and clean carburetor air cleaner

**Every 250 hours:**

Inspect crankcase ventilator valve

**Every 500 hours:**

Replace crankcase ventilator valve  
Replace carburetor air cleaner element

If engine is used in service with frequent or prolonged periods of idling, the crankcase ventilation system may require servicing more often.

**INSPECTION AND SERVICE PROCEDURE:**

**a. With engine idling —**

**1. Remove ventilator valve from rocker cover.**

If the valve is not plugged, a hissing noise will be heard as the air passes through the valve, and a strong vacuum should be felt when a finger is placed over the valve inlet.

**2. Reinstall the ventilator valve, then remove the crankcase inlet air cleaner. Loosely hold a piece of stiff paper, such as a parts tag, over the opening in the rocker cover.**

After allowing about a minute for the crankcase pressure to reduce, the paper should be sucked against the opening in the rocker cover with a noticeable force.

**b. With engine stopped —**

Remove ventilator valve from rocker cover and shake. A clicking noise should be heard to indicate that the valve mechanism is free.

**c. If the ventilation system meets the tests in (a) and (b) above, no further service is required; if not, the ventilation valve should be replaced and the system rechecked. Install a new Chrysler Ventilator Valve. DO NOT ATTEMPT TO CLEAN THE OLD VENTILATOR VALVE!**

**d. With a new ventilator valve installed, if the paper is not sucked against the crankcase inlet air cleaner opening in the rocker cover with noticeable force, it will be necessary to clean the ventilator hose and the passages in the lower part of the carburetor.**

**1. Clean the carburetor hose with Combustion Chamber Con-**

ditioner, (Part No. 3419126) or similar solvent. Dry with compressed air. **NOTE: Hoses should not remain in cleaning solvent more than ½ hour.**

2. Remove carburetor. Turn a ¼ inch drill by hand through the passages to dislodge the solid particles, then blow clean. If necessary, use a smaller drill so that no metal is removed. **IT IS NOT NECESSARY TO DISASSEMBLE THE CARBURETOR FOR THIS SERVICE.**

- e. Clean the crankcase inlet air cleaner.
- f. Clean carburetor air cleaner.

#### **CRANKCASE INLET AIR CLEANER:**

Disconnect the hose from the crankcase inlet air cleaner. (Fig. 22) Inspect the hose from the crankcase inlet air cleaner to the carburetor air cleaner or flame arrestor and clean if necessary. Remove the crankcase inlet air cleaner and wash it thoroughly in kerosene or similar solvent. Lubricate or wet the filter, by inverting the crankcase inlet air cleaner and filling with SAE 30 engine oil. Position the air cleaner to allow excess oil to drain thoroughly through the vent nipple located on the top of the air cleaner. Reinstall crankcase inlet air cleaner and hoses.

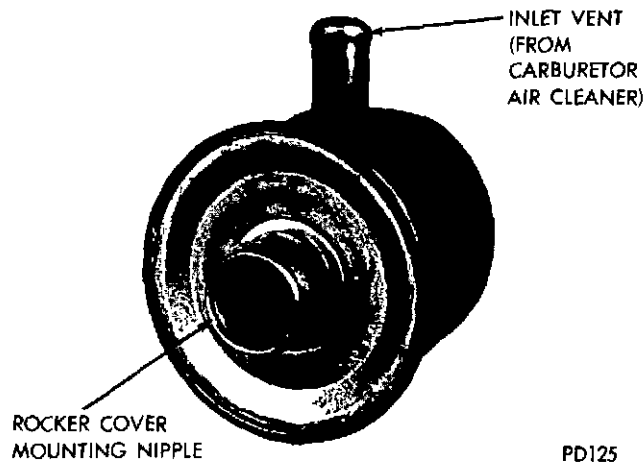


Figure 22 — Crankcase Inlet Air Cleaner

## **EXHAUST SYSTEM:**

Exhaust from the combustion chambers passes through the exhaust valve ports into the exhaust manifold and out through the exhaust pipe. The LH318 and LH360, V8 Industrial Engines are equipped with a manifold heat control valve, which permits faster warm-up 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 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 counterweight fits over the outer end of the valve shaft. 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 spring must contact the stop pin to provide proper spring tension.

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 3419129, 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 (Figure 23).

## **COOLING SYSTEM: (Figure 24)**

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

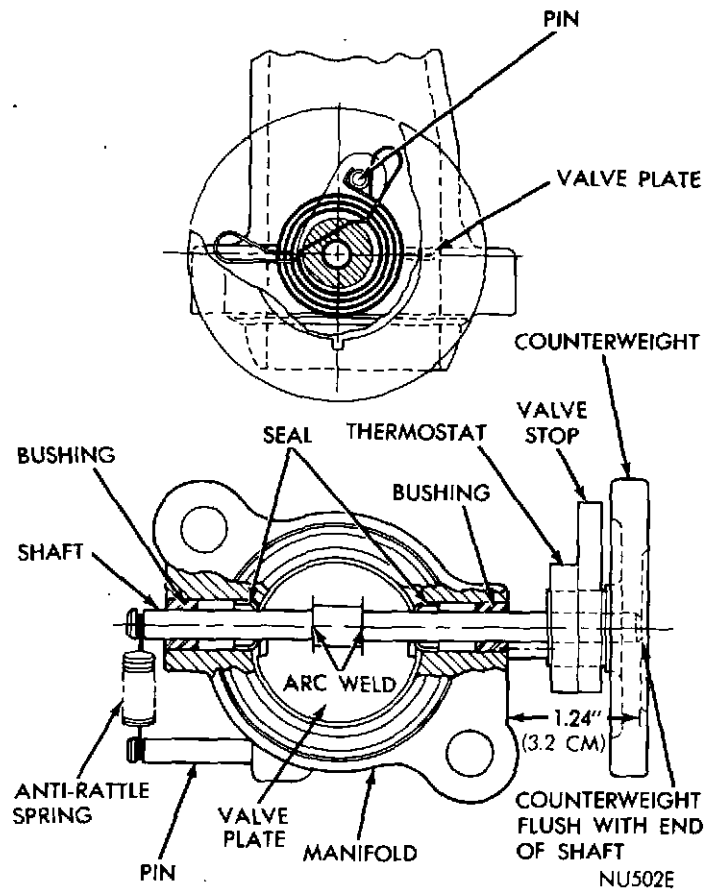
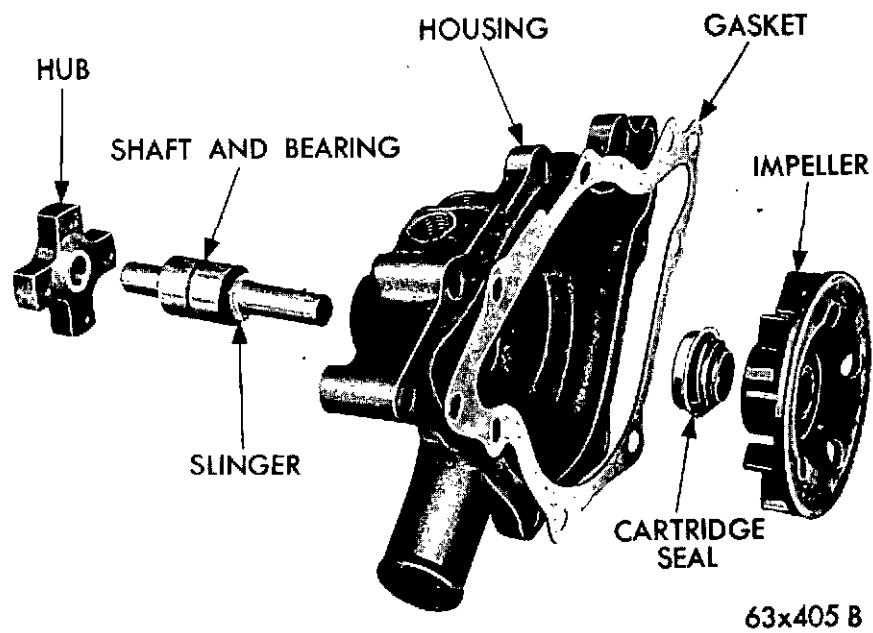


Figure 23 — Manifold Heat Control Valve—  
318 and 360 Engines

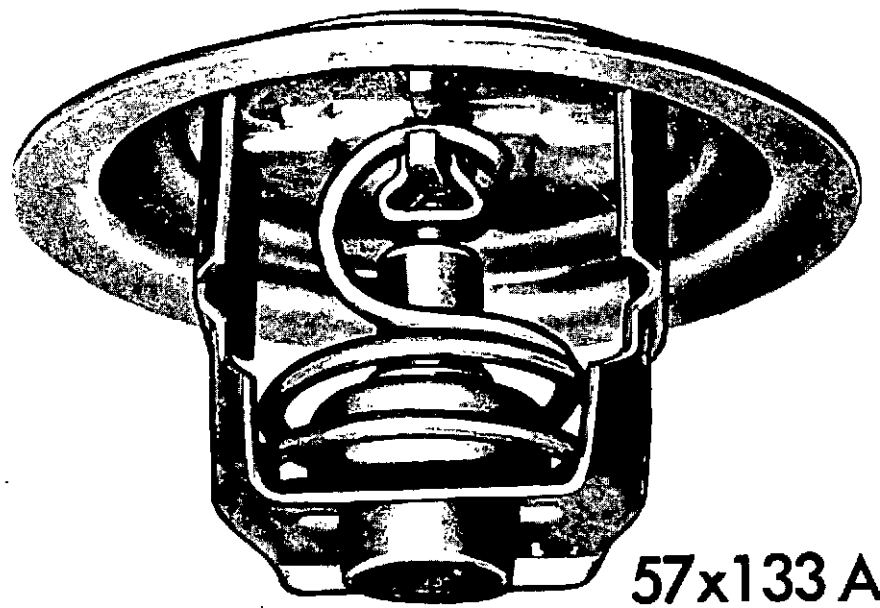
passages to the thermostat housing, for recirculation or return to the radiator, or heat exchanger.

The fan belt tension should be checked occasionally and, if necessary, adjust so that it can be deflected about  $\frac{1}{8}$  inch with fingers midway between the pulleys (8 to 10 pounds pressure applied to belt). To adjust, loosen the alternator mounting bracket pivot bolts and the adjusting strap lock screw. Pull outward on the alternator until the belt is under proper tension, then retighten. Do not use a pry bar.



63x405 B

Figure 24 — Water Pump



57x133 A

Figure 25 — Thermostat (Typical)

### **THERMOSTAT:**

The thermostat, as shown in Figure 25, restricts water flow to the radiator until the water has reached a predetermined temperature, thereby permitting faster warm-up of the engine.

Three drains 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.

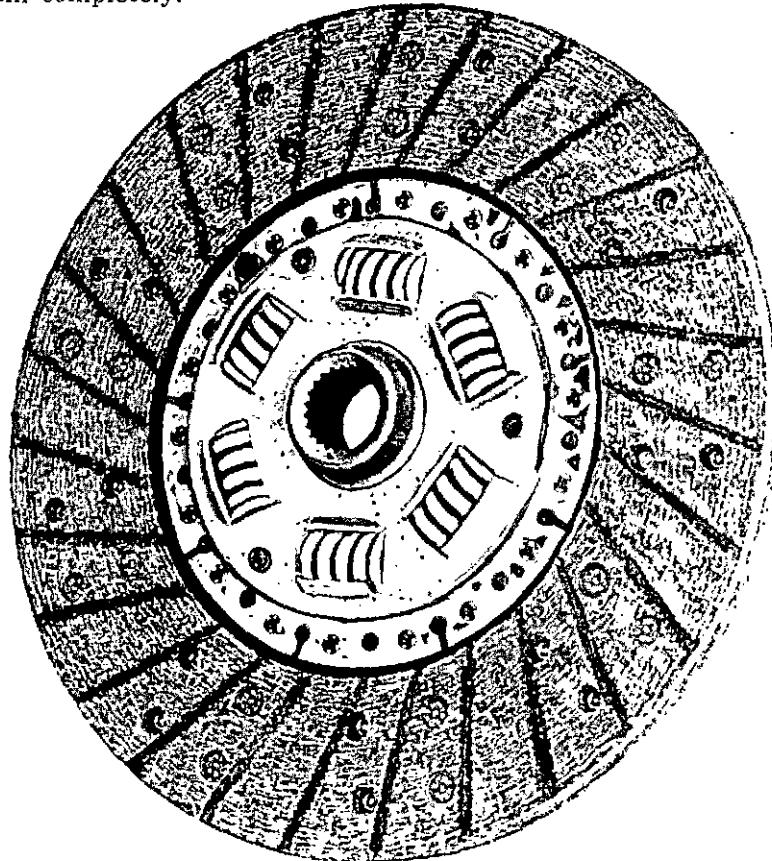


Figure 26 — Clutch Disc Assembly

### **CLUTCH: (Figure 26)**

The type of clutch used is determined by the type of drive adaptation. Attached to the crankshaft is 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 (Figure 27) 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

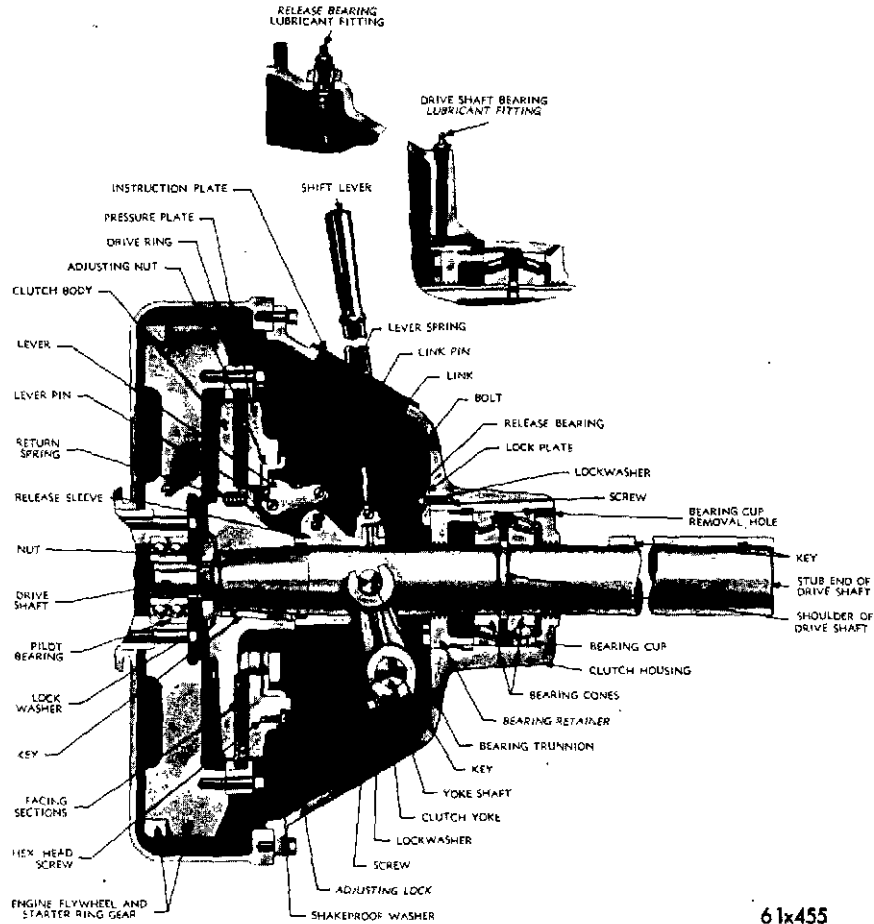


Figure 27 — Power Take-Off Assembly (Sectional) (Rockford)

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:**

##### **MODEL 435 TRANSMISSION (4 Speed):**

The four-speed Model 435 transmission is a rugged, exceptionally smooth, easy shifting transmission. All gears are of helical design except first and reverse, which are spur type.

The counter shaft and all its gears are a single unit. Engagement of the third and fourth gear is aided by pin type synchronizers. The second-speed gear is also synchronized (Figure 28).

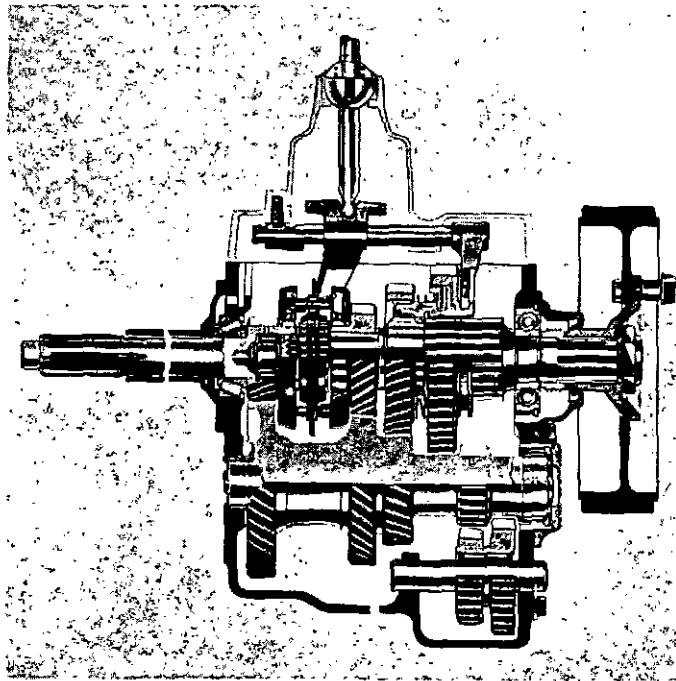


Figure 28 — Transmission Assembly 4-Speed (Model 435)

**MODEL 542 TRANSMISSION (5-Speed):**

The five-speed manual transmission with high ratio first and reverse gears provides greater torque multiplication than is available with the four-speed transmission. All of the gears are of the helical design except first and reverse, which are the straight spur-type (Figure 29).

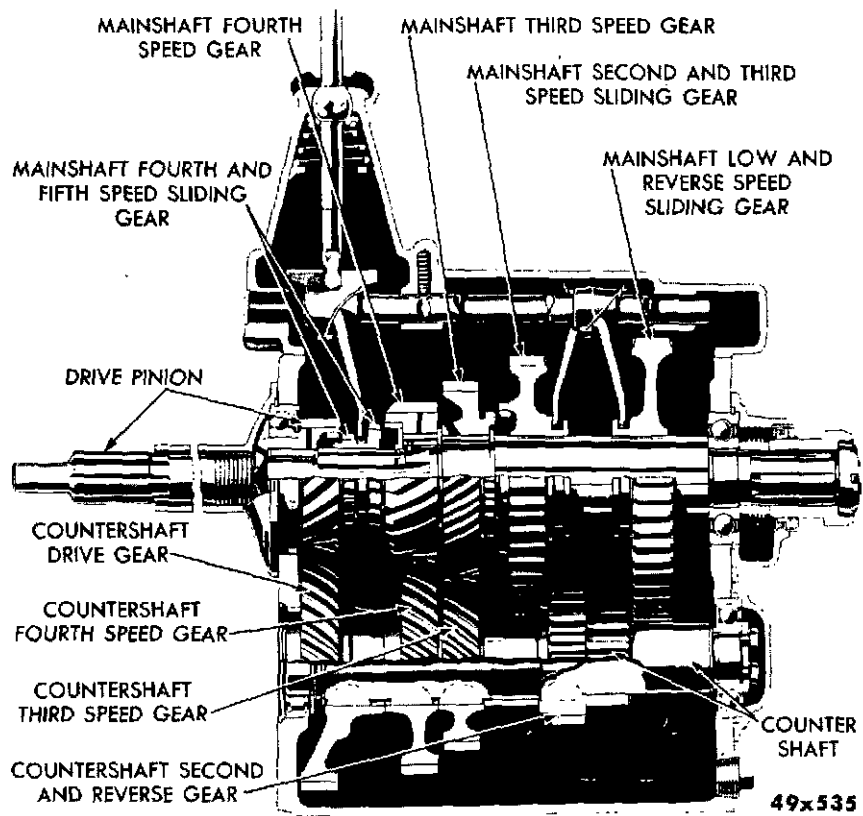


Figure 29 — Transmission Assembly 5-Speed (Model 542)

FRONT OF TRUCK

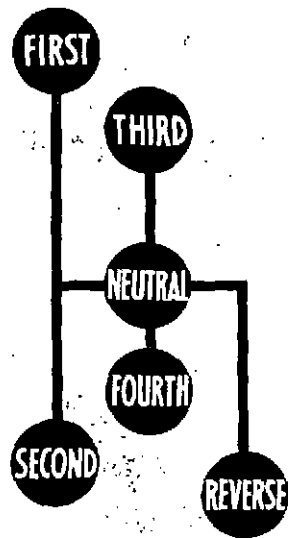


Figure 30 — Gearshift Lever Positions 4-Speed (Model 435)

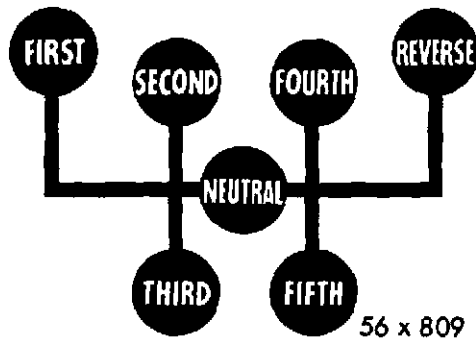


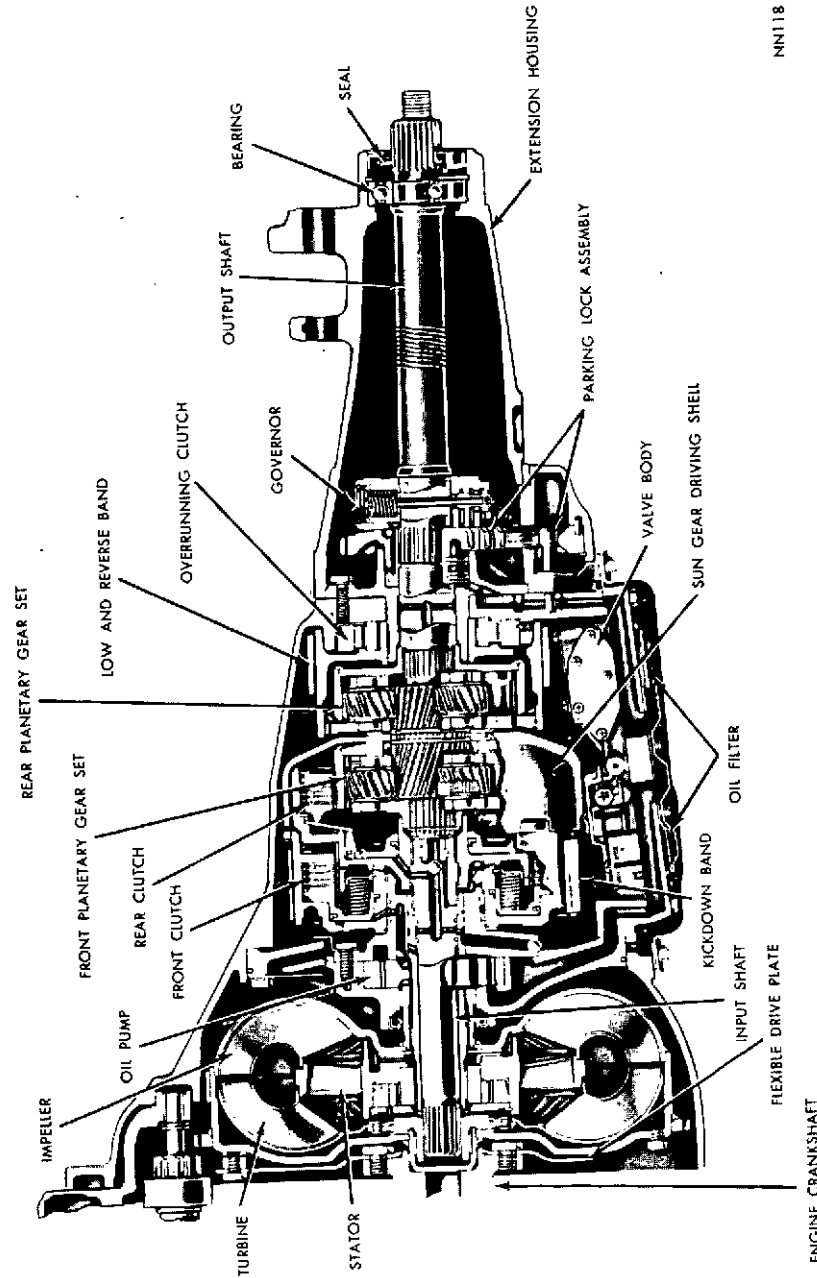
Figure 31 — Gearshift Lever Positions 5-Speed (Model 542) .

**LOADFLITE TRANSMISSION (3-Speed Automatic):**

The three-speed automatic LoadFlite Transmission combines a torque converter with a fully automatic three-speed planetary gear system (Figure 32).

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.



NN118

Figure 32 — Automatic Transmission 3-Speed (Model 727)

# 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 SE or CC." It should be retained until the regularly scheduled oil change, 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 Inhibitor 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 95 foot pounds torque, in sequence as shown in Figure 32.

## PRESTARTING INSTRUCTIONS:

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

## ENGINE OIL LEVEL:

Inspect the oil level and add oil, if required.

## FUEL:

Check the fuel supply. If engine is going to be inoperative for over 30 days, see storage instructions on page 77.

#### COOLING SYSTEM:

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

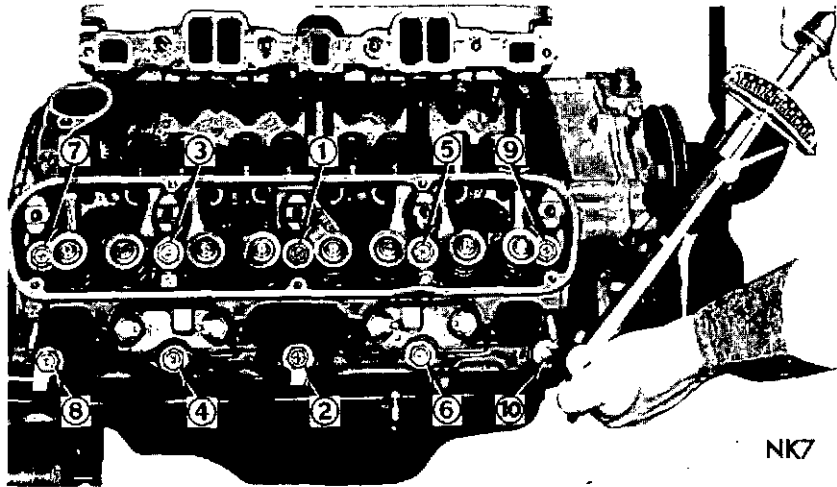


Figure 33 — Cylinder Head Tightening Sequence

## TIPS ON ENGINE CARE

#### NEW ENGINES:

It is good practice not to operate a new 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.

Engine Oil for API Service "SE" should be used in the engine during the break-in period. Keep the oil at the proper level, and retain until the regularly scheduled oil change, as recommended in the Lubrication Section.

#### COLD ENGINES:

When starting a cold engine (whether new or not), avoid unnecessary acceleration during the warm-up period. Keep the engine at idle or up to moderate speed/load conditions 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 THE ENGINE:**

1. Apply the parking brake.
2. Make sure gearshift selector is in NEUTRAL or PARK position.
3. Depress clutch pedal to disengage transmission gears (if so equipped). Then proceed as follows:

## **WITH AUTOMATIC CHOKE — NORMAL STARTING — ENGINE COLD:**

Depress accelerator pedal to the floor and release. Turn ignition key to start position and release when the engine starts. After the engine is running smoothly, tap the accelerator pedal to reduce the fast idle speed.

## **NORMAL STARTING — ENGINE WARM:**

Hold the accelerator pedal part way down while starting.

## **WITH MANUAL CHOKE — NORMAL STARTING — ENGINE COLD:**

Depress accelerator one third down. Pull choke control knob fully out. Turn ignition key to start position and release when the engine starts. After the engine is running, push in choke a small amount sufficient to prevent stalling due to excessive richness. Gradually push in choke all the way as engine warms up.

## **NORMAL STARTING — ENGINE WARM:**

Hold the accelerator pedal part way down while starting. Do not choke.

## **EXTREMELY COLD WEATHER STARTING:**

Pull choke control knob fully out. Depress accelerator full stroke — release. Then depress accelerator part way down. Turn ignition key to start position and release when the engine starts. After the engine is running, push in choke a small amount sufficient to prevent stalling due to excessive richness. Gradually push in choke all the way as engine warms up. Starting time may be longer and more choke may be needed while engine is warming up.

#### **UNUSUAL STARTING CONDITIONS — FLOODED ENGINE:**

Depress the accelerator pedal fully and hold to the floor while cranking. Do not choke.

#### **SHUTTING OFF ENGINE:**

All Gasoline Engines — Turn ignition key to "Ignition-Off" vertical position.

#### **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.

## **PRECAUTIONS**

#### **WARM-UP PERIOD:**

Warm up, per cold engine above, 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 30 to 70 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. Minimum oil pressure at idle speed is 8 pounds. A drop in oil pressure may also be the result of a plugged oil filter element (Full-Flow Type Filter).

**CAUTION: Do not exceed governed or rated speed at any time.**

#### **WATER TEMPERATURE:**

A thermostat in the cylinder block retards the circulation of liquid in the cooling system until the liquid has reached a prede-

terminated 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 (Figure 33). 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 220° F at continuous rated speed and load.

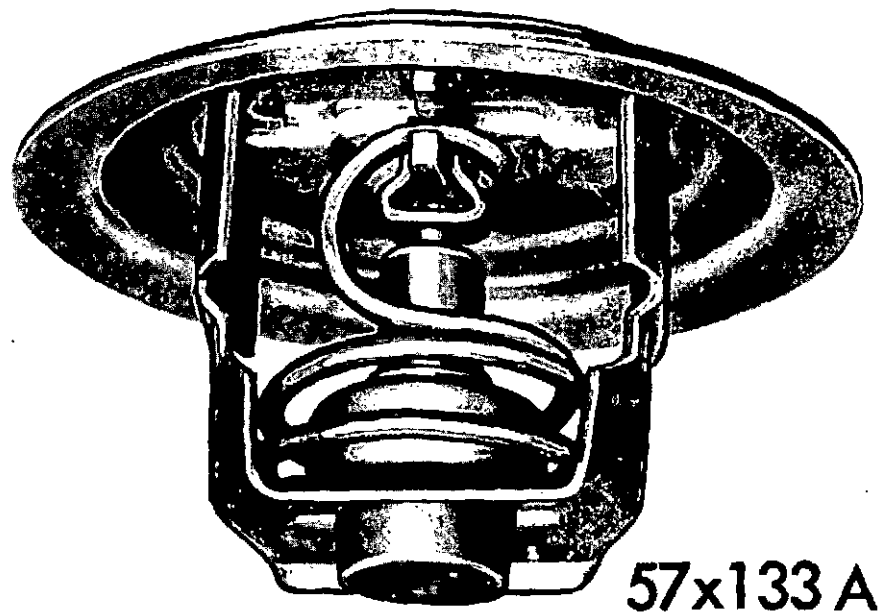


Figure 34 — Pellet Type Thermostat

#### **AIR CLEANERS:**

Remove and service the carburetor air cleaner, and crankcase ventilator air cleaner, 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 clean fresh fuel — 87 octane rating — minimum.

**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 Inhibitor 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 charge reading is 1.260 + .015 or —.005. Under 1.220 battery needs recharge.

Attempt to turn engine flywheel with a suitable flywheel turning tool to make sure the engine is free, the engine itself may be seized or rusted from improper storage.

Starter Switch Defective — Replace switch.

Open Circuit in Wiring — Inspect and test all wiring.

Inoperative Starter — Inspect the starting motor for loose brush holders, worn or corroded brushes or corrosion on the commutator. To test the starting motor, disconnect the battery cable at the solenoid switch and touch it firmly to the solenoid starter terminal. Now, if the starting motor operates, the trouble is not in the starting motor. If the starting motor fails to operate and a heavy arc occurs when the cable touches the solenoid starter terminal, a mechanical lock-up of the motor or pinion, or a grounded condition in the motor may be the cause. Failure of the starting motor to operate and no arc in the preceding test indicates poor brush contact or an open circuit in the motor winding. Repair or replace the starting motor as required.

#### **STARTER TURNS BUT DRIVE PINION DOES NOT ENGAGE:**

Starter Clutch slipping — Replace drive.

Broken teeth on Flywheel Drive Gear — Replace flywheel ring gear (see your Chrysler Industrial Engine Dealer).

Armature Shaft rusted, dirty or dry, due to lack of lubrication — Clean, test and lubricate (see your Chrysler Industrial Engine Dealer).

#### **SOLENOID PLUNGER VIBRATES BACK AND FORTH WHEN STARTER SWITCH IS ENGAGED:**

Battery low — Test specific gravity of battery. Recharge or replace battery.

Faulty wiring — Test for loose connections at starter switch and solenoid. Repair as necessary.

Lead or connections broken inside of solenoid switch cover — Test and if necessary, replace solenoid.

**STARTER OPERATES BUT WILL NOT DISENGAGE WHEN  
STARTER SWITCH IS RELEASED:**

Defective Starter Switch — Replace Switch.  
Defective Solenoid — Replace Solenoid.

**STARTER PINION JAMS OR BINDS:**

Starter Mounting Loose or Misaligned — Check to see that the nuts that hold the starter on the housing studs or attaching screws are tight. Loose attaching parts will cause misalignment of the starter pinion with the flywheel.

Broken or chipped teeth on flywheel ring gear — See your Chrysler Industrial Engine Dealer.

**STARTER WILL TURN ENGINE BUT ENGINE WILL NOT START:**

Dirt and Moisture on Ignition Wires and Distributor Cap — Be sure that the distributor cap and coil is clean, especially around the towers. Dirt and grease there can soak up moisture like a sponge, and can easily cause a short. Check for a cracked cap, arcing at the distributor cap contacts, burned rotor. If any cable terminals are corroded, be sure to clean or replace them. Clean distributor cap towers inserts. Be sure that the spark plug and coil cable terminals are fully seated and that the nipples fit tightly on the cap towers and around the cables. Replace any cracked or shorted cables.

Dirty or Corroded Distributor Contact Points — Clean points and check for excessive pitting and worn surfaces. If blue oxide is present on contacts, this is an indication that oil or grease has reached the contact surfaces and contacts should be replaced. Remove rotor and wipe all the old grease from surface of breaker cam. Apply a light film of new MoPar Cam Lubricant, Number 1473595, on breaker cam only. Do not over-lubricate, keep oil and grease away from the breaker points. Install contact points, the contact gap should be .014 to .019 inch, check breaker spring tension — 17 to 20 ounces. See "Adjustments". For electronic ignition systems, see page 63.

Fouled Spark Plugs — Caused by an over-rich carburetor adjustment or excessive oil consumption — oil entering cylinders due to worn rings or worn valve guides. Improper gap adjustment. Clean and dry plugs and set gap at .035 inch. Adjust carburetor.

Ignition Coil Failure	—Test and replace if necessary.
Condenser Failure	—Test and replace if necessary.
Improper Timing	—Refer to "Ignition Timing."
Dirt or Water in the Fuel Line or Carburetor	—Check.

Carburetor Flooded —See "Carburetor Adjustments".

Incorrect Float Level Setting—See "Carburetor Adjustments".

Ignition Coil Failure — Voltage regulator setting too high, refer to specifications and make necessary adjustments. Coil damaged by excessive heat from engine. Replace coil and inspect condition of distributor points. Coil case or tower cracked or leak at coil tower; replace coil. Coil tower may have a carbon track from tower to primary terminal; wipe tower clean and test coil.

## FUEL SYSTEM DIFFICULTIES

### FUEL DOES NOT REACH CARBURETOR:

Out of fuel — Tank empty.  
Vent pipe in fuel tank clogged.  
Shut-off valve may be closed.  
Fuel lines restricted.

### FUEL PUMP NOT OPERATING:

Inspect Filter Bowl Gasket — Replace if damaged. Tighten filter bowl retaining screw. (A quick and reliable check for air leaks is to submerge the end of the fuel discharge line in gasoline and check for air bubbles while cranking the engine.)

Inspect for Diaphragm Failure — With engine running, a leaking diaphragm will always result in gasoline leakage at the air vent.

Test Fuel Delivery Rate — Disconnect fuel line at carburetor and while cranking the engine with ignition off, discharge the fuel into a suitable container. The amount of gasoline discharged for five pulsations of the pump should be 90 to 100 cubic centimeters (approximately 1/5 pint).

### FUEL REACHES CARBURETOR BUT DOES NOT REACH CYLINDERS:

Remove spark plugs and see if they are moist. If there is no trace of gasoline in the cylinders . . .

The carburetor may be out of adjustment.

The float level may be too low or float valve stuck on the seat.

Carburetor fuel jets or passages clogged with dirt or gum.

### CARBURETOR FLOODED:

If the spark plugs are wet, this indicates the choke has been used too long or there is an overly rich carburetor mixture. Push the choke button in, if so equipped, open the throttle fully, and press the starter button.

**GENERAL LUBRICATION**

<b>Name of Unit</b>	<b>Capacity</b>	<b>How Lubricated</b>	<b>Type of Lubricant</b>	<b>When Required</b>
<b>DAILY</b>				
Oil Level Indicator	.....	.....	.....	Check oil level daily.
Carburetor Air Cleaner	.....	.....	.....	Check oil daily if engine is operated under extremely dusty conditions. If the sump is found to contain a semi-solid mixture of oil and dirt up to the air cleaner shelf, the air cleaner should be serviced as outlined under every 50 hours of operation.
Power Take-Off	.....	Front fitting on side of housing.	Multi-Purpose Grease	Daily.
<b>EVERY 25 HOURS</b>				
Governor Linkage	Few Drops	Oil Can	Engine Oil	Every 25 hours.

**EVERY 50 HOURS**

Engine (Oil Pan)	LH318, LH360, Remove plug in bottom of oil pan to drain oil. Install plug. Add oil through filler pipe to bring to proper level.	Refer to engine oil recommendations.	Every 50 hours. Replace oil if engine is idle 50 days or longer.
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\*Front sump oil pans are 6 qt. capacity plus 1 qt. for oil filter.

Oil Bath Carburetor Air Cleaner	One Quart	Remove cover and filter element, rinse element clean in kerosene and drain. Empty dirty oil from reservoir, clean out the sump and refill to indicated level with fresh oil.	Engine Oil SAE 10W-30	Every 50 hours. Clean more often if engine is operated under extremely dusty conditions. If SAE 40 Engine Oil is not available, SAE 30 may be used.
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Name of Unit	Capacity	How Lubricated	Type of Lubricant	When Required
<b>EVERY 50 HOURS (Cont'd)</b>				
Carburetor Paper Air Cleaner	.....	Blow out dirt gently with an air hose. Do not tap or immerse element in liquid.	.....	Replace paper cleaner every 500 hours or sooner depending on severity of service.
Power Take-Off	.....	Rear fitting on side housing and fitting on end of shaft.	Multi-Purpose Grease	Every 50 hours.
Clutch Linkage	.....	Oil Can	Engine Oil	Every 50 hours.
Transmission (Manual)	.....	.....	Multi-Purpose Gear Lubricant	Check oil level every 50 hours. Replace oil every 500 hours or 6 months, as in last item of this table.

Name of Unit	Capacity	How Lubricated	Type of Lubricant	When Required
<b>EVERY 100 HOURS</b>				
Oil Filter (Full-Flow Type) Replaceable Element	.....  One quart	Remove cover, gasket and element. Wipe clean, inside of filter casing and install new MOPAR filter element and gasket. Install cover. Then, idle engine for about five minutes and correct oil level in engine oil pan to compensate for oil absorbed by the filter.	.....	Service filter more often if engine is operated under extremely dusty conditions.
Oil Filter (Screw on, Throw Away Type)	.....  One quart	Unscrew the filter from the base and discard. Wipe the base clean and screw on a new filter until the gasket on the filter contacts the base. Tighten at least 1/4 turn more. Run engine to check for leaks. Add oil to full mark on the dipstick.	.....	Operation in dusty areas will require more frequent filter changes.

Name of Unit	Capacity	How Lubricated	Type of Lubricant	When Required
Crankcase Ventilator Valve	.....	Remove from engine and wash thoroughly in kerosene or similar solvent. Allow filter element to dry and re-oil. Allow excess oil to drain thoroughly through the vent nipple located on top of the air cleaner.	Engine oil SAE 30	Check operation of valve for proper function. Every 100 hours. If engine is used in service with frequent or prolonged periods of idling, the crankcase ventilation system should be serviced more frequently.
Crankcase Inlet Air Cleaner	.....	Remove from engine and wash thoroughly in kerosene or similar solvent. Allow filter element to dry and re-oil. Allow excess oil to drain thoroughly through the vent nipple located on top of the air cleaner.	Engine oil SAE 30	Every 100 hours. If engine is used in service with frequent or prolonged periods of idling, the crankcase ventilation system should be serviced more frequently.
<b>EVERY 250 HOURS</b>				
Breaker Point Distributor Wick	2 or 3 drops	Remove distributor cap and rotor and oil wick in center of cam.	Engine Oil SAE 10-W	Every 250 hours.
Distributor Cam	.....	Wipe old grease from surface of the breaker cam and apply a light film of new distributor cam grease.	MoPar Cam Lubricant, Part No. 1473595	Every 250 hours.

Name of Unit	Capacity	How Lubricated	Type of Lubricant	When Required
<b>EVERY 500 HOURS</b>				
Loadlite Automatic (A727)	18½ Pints (Dry Fill)	Remove the drain plug from the oil pan, or remove oil pan as required. Remove the torque converter access plate, remove the converter drain plug.	Dexron Automatic Transmission Fluid	Every 500 hours or 6 months. Severe Usage (such as prolonged operation with heavy loading) Every 300 hrs.
Transmission 5-Speed & 542)	9½ Pints	Remove drain plug in bottom of case to drain lubricant. Install plug. Fill transmission to bottom of filler plug hole at side of case.	Multi-Purpose Gear Lubricant or Lubricant designed for API Service GL-5 (MIL-L-2105 A or B or the SAE viscosity number.	Every 500 hours or 6 months. If SAE 80 is not available, SAE 90 blended with 20% SAE 10-W Engine Oil may be used.
		Above +90°F. As Low as -10°F. Below -10°F.	Use SAE 140 Use SAE 90 Use SAE 80	

Name of Unit	Capacity	How Lubricated	Type of Lubricant	When Required
<b>EVERY 500 HOURS (Cont'd)</b>				
Carburetor Paper Air Cleaner	.....	Blow out dirt gently with an air hose. Do not tap or immerse element in liquid.		Replace paper cleaner every 500 hours.
Fuel Filter	.....	Replaceable Paper Element Type. Disas- semble, clean cartridge holder and replace cartridge. In reassem- bly tighten securely and run the engine to check for leaks. One Piece Type. Remove and replace with new filter.		

# LUBRICATION

## SELECTION OF LUBRICANT — ENGINE OIL

The type of service for which an engine oil is intended is usually designated by the letters SE or CC on the container. These are service classifications established by the API (American Petroleum Institute). This system does not replace the SAE (Society of Automotive Engineers) grade number of the oil which indicates the viscosity or consistency of the oil recommended.

For best performance and engine protection, the Chrysler corporation recommends that the operator select:

1. An oil which conforms to the requirements of API classification "For Service SE or CC."
2. An oil of proper SAE grade number in accordance with the recommendations for the anticipated temperature shown in the following table:

Anticipated Temperature Range	Recommended Viscosity Grade No.	Recommended Multi-Viscosity Oils
Above +32°F	SAE 30	SAE 20W-40
As low as +10°F	SAE 20-W	SAE 20W-40 SAE 10W-30 SAE 10W-20
As low as —10°F	SAE 10-W	SAE 10W-30 SAE 10W-20 SAE 5W-20
Below —10°F	SAE 5-W	SAE 5W-20

Chrysler Corporation does not recommend the use of any lubricant which does not have both an SAE designation and an SE or CC service classification on the container.

## BREAK-IN PERIOD:

For industrial engine break-in, a good quality engine oil of an approved API classification should be used, SE or CC minimum.

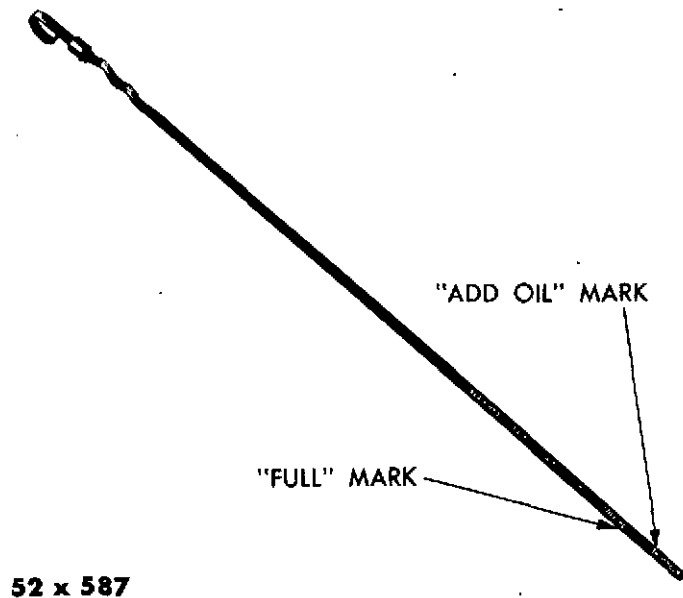
Viscosity of the oil to be used should be based on ambient temperature of the engine operational area. Oil viscosity should be selected from the viscosity-temperature chart under "Selection of Lubricant". After 25 hours of operation, the crankcase oil should be drained, and the crankcase refilled with the correct oil type and SAE viscosity grade.

### CHANGING OIL:

Frequency of oil change is determined by the type of operation and by operating conditions. Under normal operating conditions, oil should be changed after each 50 hours of operation. High speed, heavy load and extremely dusty conditions necessitate more frequent changes. A comparison of the oil on the indicator with fresh oil will usually serve as a guide. Lack of body, the presence of dirt and grit in the oil indicates that fresh oil is needed. Drain the oil while the engine is hot, as the oil will flow freely and will carry more dirt and other foreign matter with it. For engine crankcase capacities see "General Lubrication" section of this manual.

### ADDING OIL:

Between oil changes, check the oil level daily. The oil level indicator (Figure 35) is of the bayonet type, with two markings, "FULL" and "ADD OIL". After the engine has been standing, the oil level should be at the "FULL" mark. After the engine has started, this level will drop somewhat, due to the filling of oil passages and the oil filter. A quart of oil should be added when



52 x 587

Figure 35 — Engine Oil Level Indicator

the level is at or slightly below the "ADD OIL" mark. Do not run the engine with the oil level below the "ADD OIL" mark.

#### **COLD WEATHER OPERATION:**

During cold weather, examine the oil daily for evidence of sludge or water resulting from condensation of moisture in the crankcase. Under extreme conditions, the engine may not reach normal operating temperature during a short run, with the result that fumes are not dissipated in the crankcase and sludge forms. This sludge may freeze or clog the oil inlet strainer, retarding lubrication of internal parts. If there is evidence of sludge, change the oil. If excessive sludge accumulation is evident, remove the oil pan and clean all accessible parts, including the oil inlet strainer, as thoroughly as possible. Use a new oil pan gasket when assembling the oil pan.

#### **DUSTY CONDITIONS:**

Operation in dust laden air greatly increases the problem of keeping abrasive materials out of the engine. Under these conditions special attention should be given to the carburetor air cleaner, the filler pipe cap air cleaner, and the crankcase ventilator valve, or crankcase ventilator pipe air cleaner, if so equipped, making sure that they are clean and in serviceable condition at all times. This will reduce the amount of abrasive material that may enter the engine. For operation under extremely dusty conditions the use of a closed or positive crankcase ventilation system making use of a crankcase ventilator flow control valve is recommended.

As a further precaution in preventing excessive wear and possible failure of parts under these dusty conditions, the engine oil and the oil filter cartridge should be changed more frequently. The frequency will depend upon the severity of the dust conditions; therefore, no definite recommendations can be made.

It is always advisable to drain the crankcase while the engine is at operating temperature. Oil will drain more completely when hot, and will, therefore, carry more of the foreign matter and dirt away with it.

#### **FULL-FLOW OIL FILTER:**

The full-flow filter cleans the oil as it comes from the oil pump. It is so constructed and installed that it is impossible for

the supply of oil to be cut off to the engine even though the filter becomes clogged. If the filter becomes clogged, the oil will not be filtered but will be pumped to the working parts of the engine at reduced pressure through the safety by-pass valve in the top of the filter body. When the filter is operating properly, oil pressure indicated on the oil pressure gauge should be 45 to 65 pounds at operating speeds. If this pressure drops to 35 pounds, the filter element may be plugged and should be changed.

The full-flow oil filter cartridge should be replaced every 100 hours of operation. In dusty areas or under severe operating conditions, it is advisable to change the filter cartridge more frequently.

**TO REPLACE FULL-FLOW FILTER ELEMENT (Figure 36):**

While the engine is warm, remove the filter cover, the cover gasket, and the filter element. Wipe the housing clean and install the new filter element. Install a new cover gasket and the cover.

After replacing the filter cartridge, the engine should be operated for a period of five minutes and check made for leaks. The oil level should then be corrected to compensate for the oil absorbed by the new filter cartridge.

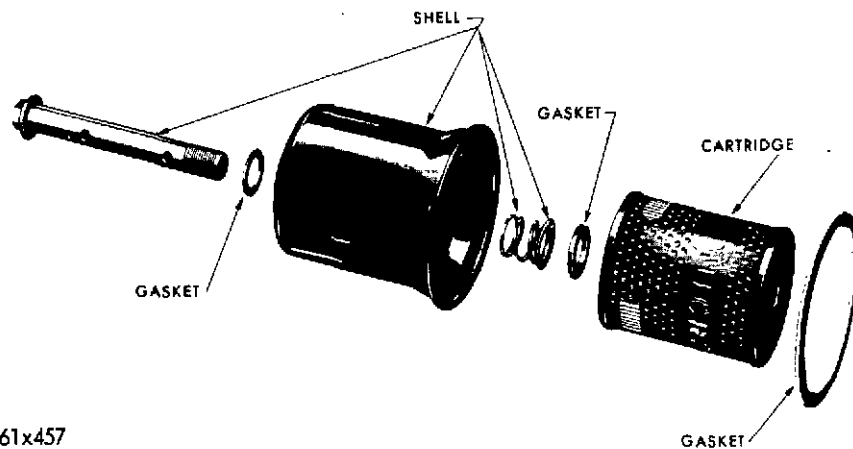


Figure 36 — Engine Oil Filter (Replaceable Element Type)

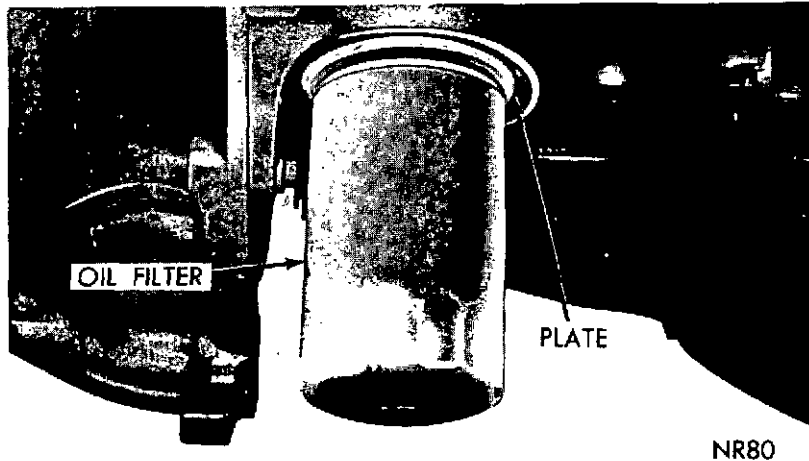


Figure 37 — Engine Oil Filter (Screw On Type)

**ENGINE OIL FILTER ("SCREW ON" TYPE) — (Figure 37):**

On some engines the "Screw on, throw away" full-flow sealed filter unit is used. The screw-on type oil filter should be replaced every 100 hours of operation.

It is only necessary to unscrew the filter from the base by hand and discard. Wipe the base clean and screw on a new filter until the gasket on filter contacts the base. Tighten at least  $\frac{1}{2}$  turn more, as no tools are necessary. Run engine to check for leaks. Add oil to bring level to full mark on the dipstick.

**FUEL FILTER:**

The fuel filter located between the fuel pump and the carburetor on all models contains a paper element, replaceable type, or the complete throw-away type.

**OIL BATH CARBURETOR AIR CLEANERS:**

The oil bath carburetor air cleaner (Figure 38) should be examined weekly or every 25 hours in normal operation. If the quantity of dirt in the sump is sufficient to reach the lower offset in the reservoir, the air cleaner should be removed and thoroughly cleaned.

**EVERY 50 HOURS:**

Remove cover and filter element assembly and rinse in kero-

sene and drain. Empty the dirty oil from reservoir, clean out the sump and refill to indicated level with engine oil SAE 10W-30.

Engines operated in dusty territories will require more frequent attention. Under extreme conditions daily service may be necessary.

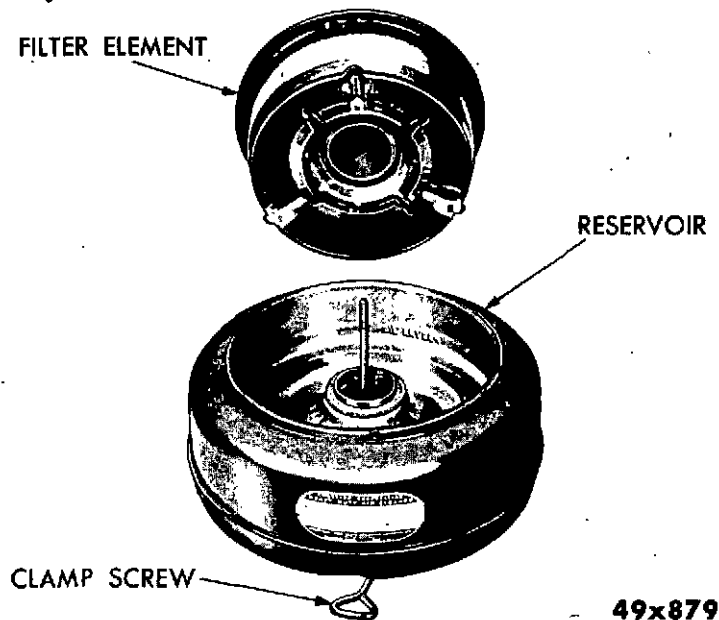


Figure 38 — Oil Bath Carburetor Air Cleaner

#### **CARBURETOR PAPER AIR CLEANERS:**

Paper carburetor air cleaners should be cleaned every 50 hours of every month in normal use. In areas of extreme dust or dirt, cleaning should be performed more frequently, as often as once a day, if necessary.

To clean the paper element, the following procedure should be used:

Remove cleaner assembly, remove paper element, blow out dirt gently with an air hose. Direct air from inside out, and keep nozzle two (2) inches away from element to avoid damaging. Do not tap or immerse element in liquid. Wash the cleaner cover and body with cleaning solvent, such as kerosene and wipe dry (Figure 39). Replace paper element, center and secure firmly. Replace cleaner assembly on engine. Replace paper element every 500 hours.

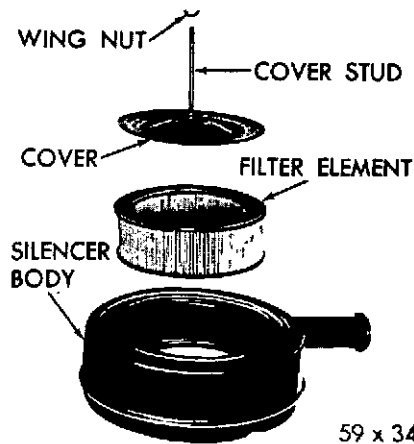


Figure 39 — Carburetor Air Cleaner (Paper Type)

**CRANKCASE VENTILATING AIR CLEANERS:**

After each 50 hours of operation, or with each oil change, remove the air cleaner from the oil filler pipe (Figure 40), wash in kerosene, dry and re-oil with SAE 30 Engine Oil, or more frequently in dusty conditions.

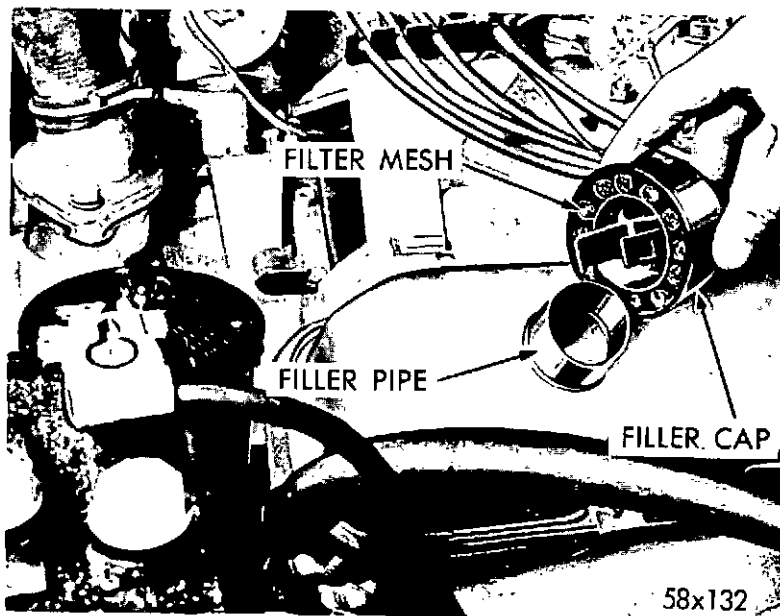


Figure 40 — Engine Ventilation Inlet Air Cleaner

#### **MECHANICAL GOVERNOR:**

This mechanical governor is mounted on the distributor support housing and is gear driven from the distributor. It is lubricated by engine oil through the restrictor elbow in the governor housing. The tachometer cable is driven by nylon gears at the upper end of the governor shaft. The tachometer gears are sealed away from engine oil. And if an overhaul is necessary, it should be cleaned and lubricated.

#### **WATER PUMP:**

All models have permanently sealed bearings which require no service lubrication, with the exception of the high water pump with right hand water inlet; this water pump does require lubrication.

#### **ALTERNATOR:**

The alternator bearings are permanently lubricated and do not require lubrication.

#### **DISTRIBUTOR:**

The distributor (Figure 41) should be lubricated at three points: (1) Oil cup on the side of the distributor if so adapted;

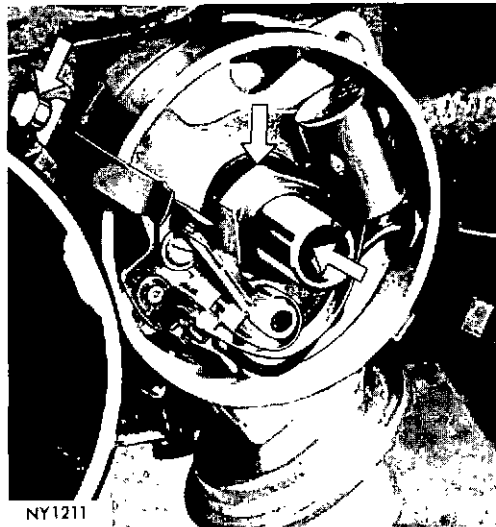


Figure 41 — Distributor Lubrication Points (Typical)

and (2) Wick under the rotor in the center of the cam. Apply a few drops of SAE 10W Engine Oil to the oil cup, if so equipped, after each 25 hours of operation. After 250 hours of operation, remove the distributor cap and rotor and apply two or three drops of SAE 10W Engine Oil to the cam wick; (3) Wipe old grease from surface of the breaker cam. Apply a tight film of new distributor cam grease, MoPar Number 1473595.

**CAUTION: KEEP OIL AND GREASE AWAY FROM CONTACT POINTS.**

Electronic ignition distributors require no periodic lubrication.

### 3-SPEED, 4-SPEED, 5-SPEED TRANSMISSIONS:

Remove the filler plug and inspect the level of the lubricant after each 50 hours of operation (Figure 42). Level should be at bottom of the filler plug opening. Replenish, if necessary, with Multi-Purpose Gear Lubricant or Lubricant designed for API Service GL-5 (MIL-L-2105) A or B or the SAE viscosity number.

Above +90° F.	Use SAE 140
As Low as -10° F.	Use SAE 90
Below -10° F.	Use SAE 80

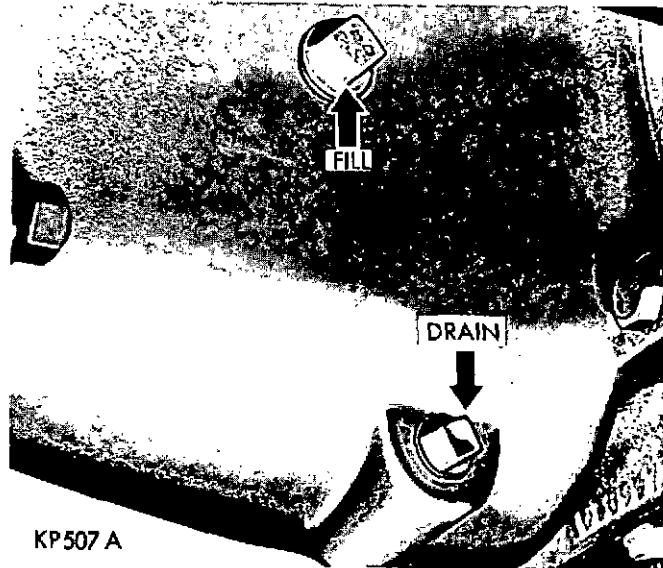


Figure 42 — Transmission Fill and Drain Points (Typical)

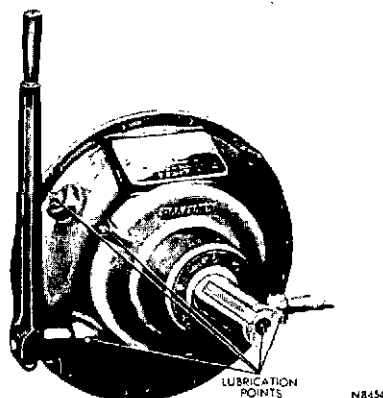
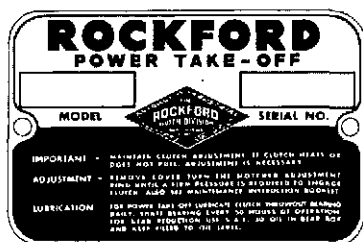


Figure 43 — Power Take-Off Lubrication

If SAE 80 is not available, SAE 90 blended with 20% SAE 10-W Engine Oil may be used. Drain and refill the transmission prior to anticipated temperature change or after each 500 hours of operation. See "General Lubrication" for all Transmission capacities.

**POWER TAKE-OFF WITH HEAVY DUTY CLUTCH:**

Five lubrication fittings are provided for this assembly (Figure 43), one or two on the side of the housing and one at the end of the shaft, and one located on each yoke shaft boss. On some units, the fitting for the clutch release is inside the housing, accessible by removing a small plate at the left side of the housing.

The clutch release throwout bearing should be lubricated through the front grease fitting at the clutch housing, or through the fitting located inside of the housing with multi-purpose grease after every 8 hours of operation. Lubricate sparingly to avoid grease on the clutch facing.

For some types of installation, the pilot bearing must be lubricated from the side of the shaft rather than the end. In such case,

remove the small plug from the shaft, install a grease fitting in its place and use Multi-Purpose Grease. Remove the fitting from the end of the shaft after lubrication and replace with the plug.

The drive shaft main bearing and the pilot bearing should be lubricated through the grease fitting on the housing with Multi-Purpose Grease every 50 hours of operation.

**CAUTION: DO NOT OVER-GREASE.**

The clutch levers and linkage should be lubricated with engine oil every 500 hours of operation. Remove the inspection hole cover on the clutch housing and lubricate the toggle joints with engine oil to help keep the joints free.

Lubrication of the yoke shaft is as needed, with multi-purpose grease.

## **ADJUSTMENTS**

### **ELECTRICAL SYSTEM:**

#### **DISTRIBUTOR CONTACT POINTS:**

In order to maintain efficient operation, the contact points in the distributor must be adjusted properly, as follows:

To adjust breaker points, remove the distributor cap and rotor, crank the engine until the rubbing block of the movable contact rests on the highest point of a cam lobe. Loosen the contact support lock screw just enough to permit the stationary bracket to be moved. Turn the adjusting screw to open or close the point gap. The clearance between the points should be from .014 to .019 inch, as measured with a dial indicator (Figure 44). Tighten the lock screw after each adjustment and measure the breaker point spring tension with an accurate scale. Hook a spring scale on the breaker arm as close to the breaker point as possible and pull scale gently in a straight line (Figure 45). Take a reading as the points start to separate. The spring tension should be 17 to 21.5 ounces. If not, loosen the screw which holds the end of the point spring and slide the end of the spring in or out as necessary. Retighten screw and recheck spring tension.

Wipe old grease from the surface of the breaker cam and apply a light film of MoPar distributor cam lubricant (Part No. 1473595) to the breaker cam. Do not over-lubricate. Keep oil and grease away from the contact points.

**SPARK PLUGS:**

Spark plugs should be kept clean to insure economical engine operation. Every 250 hours of operation, remove the spark plugs and examine the firing ends of the plugs for evidence of oil fouling, gas fouling, burned or over-heating conditions. Clean or replace, and reset plug gaps to .035 inch. Always use new gaskets where required, when installing the spark plugs. Tighten plugs to 30 foot-pounds torque — for LH318 and LH360 engines using N series spark plugs.

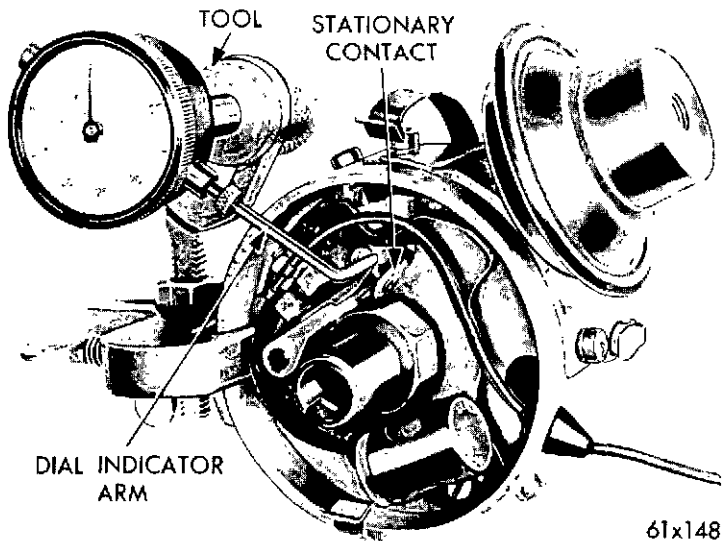


Figure 44 — Checking Point Clearance with Dial Indicator

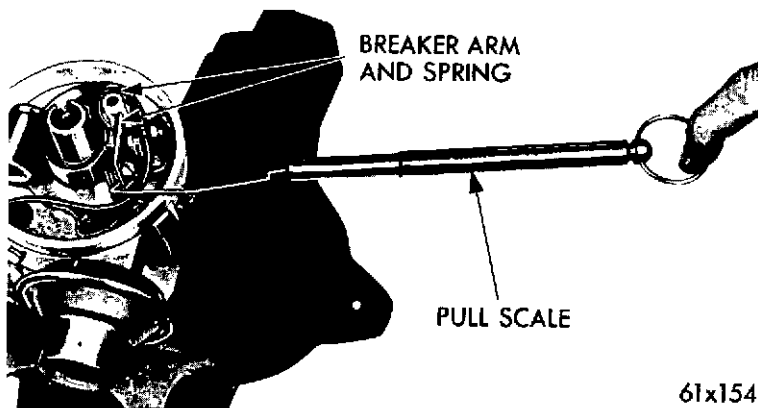


Figure 45 — Testing Breaker Arm Spring Tension

**IGNITION TIMING: SEE PROPER SPEC SHEET  
FOR BASIC ENGINE TIMING—**

To obtain maximum engine performance, the distributor must be correctly positioned to give proper ignition timing, as follows:

The ignition timing test will indicate the timing of the spark at the No. 1 piston at idle (only).

Disconnect the vacuum line at the distributor. This will eliminate any chance of vacuum advancing the breaker arm plate. The engine should operate on centrifugal advance only when checking the ignition timing. Connect the secondary lead of the Power Timing Light to No. 1 spark plug, red primary lead to the positive terminal of the battery and the black lead to the negative battery terminal.

Start the engine and set the idle to 475-500 RPM, engine at normal operating temperature (transmission in neutral).

Using a timing light, observe the position of timing mark on the vibration dampener or pulley (units so equipped) and check against the specifications.

Loosen the distributor clamp screw and rotate the distributor housing so that the specified timing mark and pointer are in alignment. (Moving distributor housing against shaft rotation advances timing and with shaft rotation retards timing).

Tighten the distributor clamp screw securely after the timing has been set and recheck timing adjustment with a Power Timing Light.

Electronic ignition distributors and breaker point distributors are timed in the same manner.

When the spark timing is correct, reconnect the vacuum line to the distributor and remove timing light.

**NOTE:** As the engine speed is increased, the timing mark should move down on the vibration dampener below the pointer if advance units are functioning.

**ELECTRONIC IGNITION DISTRIBUTOR  
AIR GAP ADJUSTMENT:**

- (1) Align one reluctor tooth with pick up coil tooth.
- (2) Loosen pick up coil hold down screw.
- (3) Insert .006 non-magnetic feeler gauge between reluctor tooth and pick up coil tooth.
- (4) Adjust air gap so that contact is made between reluctor tooth, feeler gauge, and pick up coil tooth.

- (5) Tighten hold down screw.
- (6) Remove feeler gauge. NOTE: No force should be required in removing feeler gauge.
- (7) Check air gap with a .008 feeler gauge. A .008 feeler gauge can be forced into air gap. DO NOT FORCE FEELER GAUGE INTO AIR GAP.
- (8) Apply vacuum to vacuum unit and rotate governor shaft. Pickup pole should not hit reluctor teeth. Gap was not properly adjusted if hitting occurs on only one side of reluctor, the distributor shaft is probably bent. Replace governor and shaft assembly.

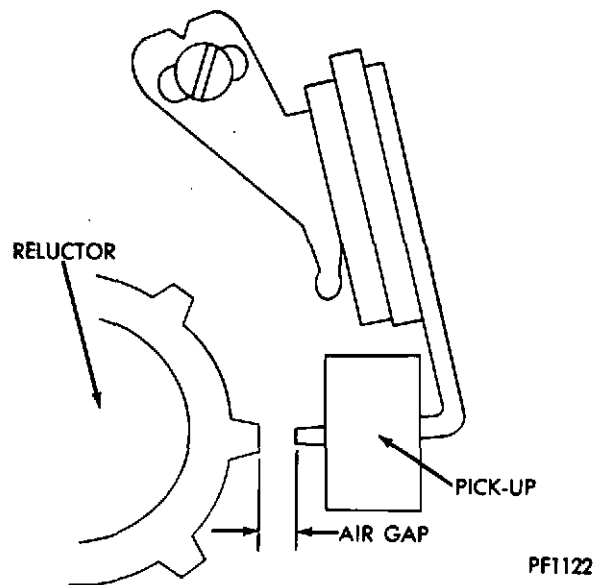


Figure 46 — Air Gap Adjustment

#### CARBURETOR ADJUSTMENT:

Before attempting any adjustment of the carburetor, check the following items:

- (1) SPARK PLUGS — See that plugs are correct type, clean, and have the correct gap. The point gap should be set at .035 inch.

(2) **DISTRIBUTOR POINTS** — See that points are clean, in good condition, and properly set (.014 to .019 inch).

(3) **ALL HIGH TENSION TERMINALS** — See that terminals are making good contact at plugs and at distributor cap.

(4) **COMPRESSION** — See that compression is approximately even in all cylinders.

(5) **CARBURETOR** — See that carburetor is clean and in good condition and firmly attached to the manifold with no air leaks.

(6) **MANIFOLD HEAT CONTROL VALVE** — See that manifold heat control valve is free and functioning correctly.

#### **IDLE SPEED ADJUSTMENT CARBURETOR:**

(1) Turn the idle speed screw in or out to obtain 500 RPM. Be sure the choke valve is fully open and that the fast idle adjusting screw is not contacting the fast idle cam (if so equipped).

(2) Turn each idle mixture screw to obtain the highest RPM. While making the adjustment, carefully watch the tachometer and notice that the speed can be decreased by turning the screws in either direction from the setting that gave the highest RPM reading.

(3) Readjust to 500 RPM with the fast idle speed screw.

(4) Turn each idle mixture adjusting screw in the clockwise direction (leaner) until there is a slight drop in RPM. Now, turn each screw out, counterclockwise (richer) just enough to regain the lost RPM.

This procedure will assure that the idle has been set to the leanest mixture possible for smooth idle. **THIS SETTING IS VERY IMPORTANT.**

Since the correct speed was originally set using the speed screw, the speed obtained after finding the leanest smooth idle setting will probably be too fast.

(5) Readjust the speed screw to obtain correct idle speed. Repeat steps 2 and 4 above, if necessary.

# PIERCE LONG RANGE GOVERNORS

(Typical)

## ADJUSTMENTS:

1. Place tension on governor spring with adjusting screw, B. Install linkage from throttle lever, A, to carburetor or valve box bellcrank, adjusting length of linkage to hold throttle just at wide open throttle lever manually to check for binding or lost motion in linkage.

2. Back out bumper screw, E, until only three or four threads are engaged and lock with locknut.

3. Start engine and run at fast idle until it is warmed to operating temperature.

4. **CONSTANT SPEED OPERATION.** Move speed change lever D by use of the stop screws C to approximately  $\frac{1}{2}$  wide open position. Adjust screw, B, to obtain top no-load speed. Check regulation by applying and removing engine load. If regulation is too broad, move speed change lever, D, approximately  $\frac{1}{4}$ " toward closed position and readjust screw B to again obtain no-load speed.

*If governor surges under load, decrease spring tension with screw, B, and move speed change lever toward open position to obtain top no-load speed. Repeat until desired regulation is obtained. Lock stop screws, C.*

5. **LONG RANGE OPERATION.** Move speed change lever, D, to approximately  $\frac{3}{4}$  of wide open position. Adjust and check regulation as in step 4. When desired regulation is obtained, adjust stop screw, C, to stop speed change lever travel at top operating speed. Move speed change lever, D, toward low speed position until desired low speed is obtained and adjust stop screw, C, to check lever travel at this point. Lock securely with locknuts.

6. Bumper Screw, E, is used to remove a no-load surge only. If governor is used for long range operation, the bumper screw can be used at the low speed only. If a no-load surge is encountered, turn bumper screw, E, in a turn at a time until the surge is removed. **DO NOT TURN IN FAR ENOUGH TO INCREASE NO-LOAD SPEED OF ENGINE.** Lock with locknut.

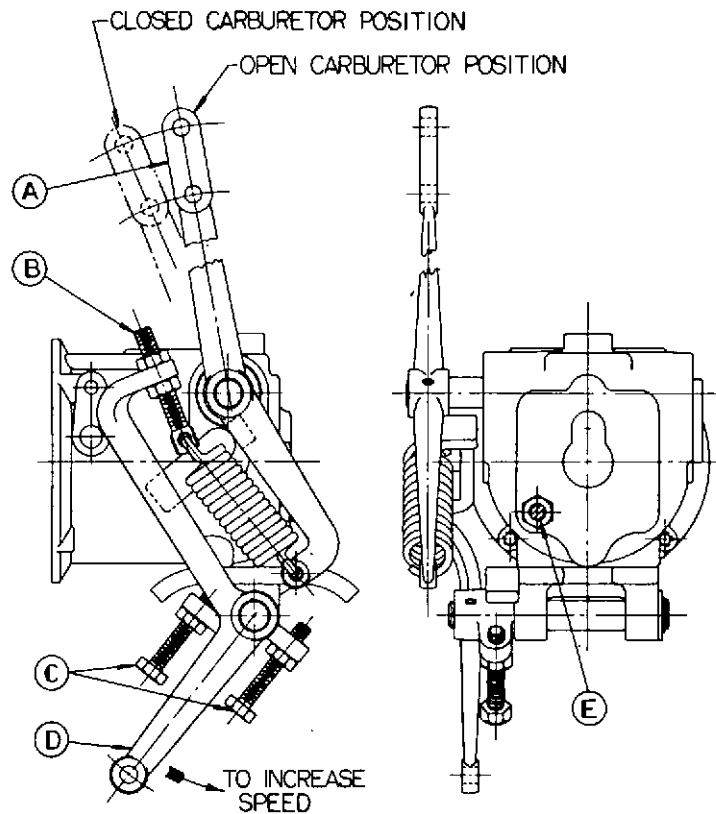


Figure 47 — Pierce Long Range Governor (Typical)

## PIERCE CONSTANT SPEED GOVERNORS

(Typical)

### ADJUSTMENTS:

1. Place tension on governor spring with adjusting screw A. Install linkage from governor throttle lever to carburetor or valve box bellcrank, adjusting length of linkage to hold bellcrank just at wide open position. Release all spring tension and operate throttle lever manually to check for binding or lost motion in linkage. Binding and lost motion must be eliminated to obtain satisfactory governor control of the engine.

2. If governor is equipped with bumper screw C, back out bumper screw until only three or four threads are engaged and lock with lock nut.

3. Start engine and operate at fast idle until warmed to operating temperature.

4. Secure specified no-load speed with adjusting screw A.

5. Check regulation by applying and removing engine load. If regulation is too broad (too great a variation in engine speed between no-load and full load), adjust regulation screw B to draw spring nearer lever hub. If governor surges under load, adjust screw B to move spring away from hub. Repeat until desired regulation is obtained.

6. Recheck speed adjustment after making regulation adjustment.

7. Bumper screw C is used to remove a no-load surge only. If governor surges at no-load, turn screw C in a turn at a time until the surge is removed. **UNDER NO CIRCUMSTANCES SHOULD BUMPER SCREW C BE TURNED IN FAR ENOUGH TO INCREASE THE NO-LOAD SPEED OF THE ENGINE.**

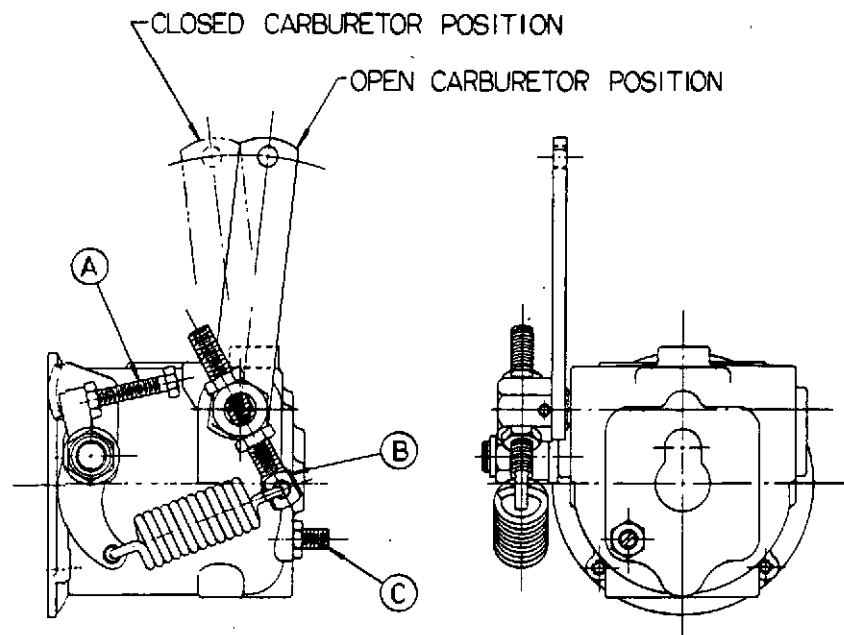


Figure 48 — Pierce Constant Speed Governors (Typical)

### ADJUSTING THE KING-SEELEY VELOCITY GOVERNOR:

Should the governor become inoperative, or require servicing, or if the correct settings cannot be obtained, the governor should be removed. Replace or take to the local King-Seeley distributor, where facilities are available for proper adjustment.

Leakage of manifold, carburetor, or interconnector gaskets must be corrected before carburetors or governors can be properly set.

It may be apparent after a long period of operation that the governor has become sluggish and is not as responsive as when it was originally installed. Such sluggishness is most generally caused by deposits of carbon and gum on the valve shaft and bearings, stabilizer piston rod or cylinder. The remedy for this condition is to remove the governor and soak it in a cleaning solvent that will remove the carbon and gum deposits. It is always recommended that a governor that is not functioning properly be soaked in cleaning solvent before any adjustments or repairs are attempted, because, in many cases, satisfactory performance can be restored in this manner. Before attempting any adjustment or recalibration of the governor, run the engine until normal operating temperature is reached. Manifold vacuum at sea level should be at least 16 inches with engine running at full throttle (governor operating), and at least 17 inches at idling speed, with an allowable reduction for altitude.

To adjust governor, refer to Figure 49 and proceed as follows:

For a HIGHER speed, turn adjusting cap (13) counter-clockwise, or to the left. For LOWER speeds, turn adjusting cap clockwise, or to the right. One turn of the adjusting screw will change the engine speed approximately 300 RPM.

When a more sensitive regulation is desired, or if the governor is too sensitive and inclined to surge at full throttle, correct as follows by means of the calibrating nut (11).

### KING-SEELEY SENSITIVITY ADJUSTMENT:

If the governor is too sensitive or has a tendency to surge, place the hollow wrench (1) in position on the calibrating nut (11), and insert the special adjusting wrench (2) through the hollow wrench into the adjusting screw and turn the screw clockwise one turn (Figure 50)

With the hollow wrench in the slot of the calibrating nut, turn

the nut clockwise about  $\frac{1}{4}$  of a turn. When this adjustment is made, the adjusting screw must be held from turning.

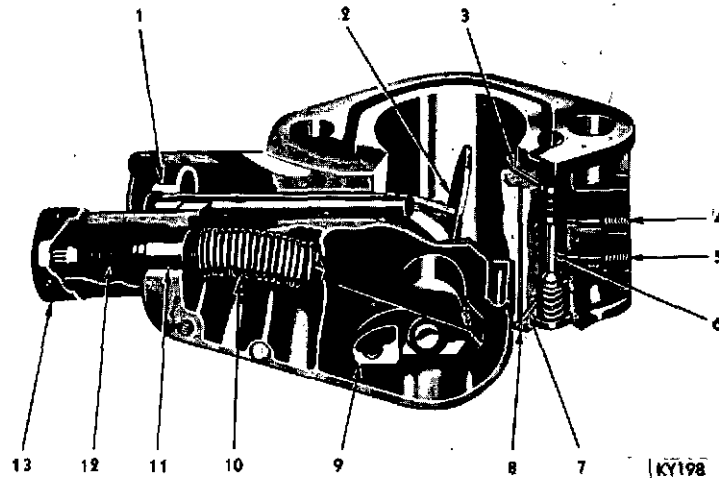


Figure 49 — King-Seeley (Handy) Governor (Sectional View)

Continue this adjustment until the surge is eliminated. However, engines operate most efficiently when the governor is adjusted to the point which just barely eliminates the surge at full throttle.

#### **KING-SEELEY REACTION ADJUSTMENT:**

If the governor is slow acting and does not open promptly when a load is applied at the governed speed or cut off promptly at maximum speed, turn the adjusting screw counter-clockwise one turn; and while holding the screw in the new position, turn the calibrating nut counter-clockwise  $\frac{1}{4}$  of a turn. Repeat this procedure until the desired regulation is obtained. However, when making this adjustment, it is best to continue until an actual surge is produced, and then, just eliminate the surge.

When the adjustment is completed, tap lightly on the end of the hollow wrench so that the calibrating nut will be properly seated and recheck speed.

The stock numbers of the special wrenches (Figure 50) are as follows:

A-24283 (Item 1)

A-25264 (Item 2)

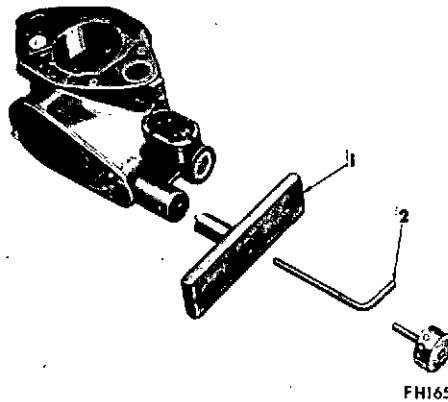


Figure 50 — King-Seeley Adjusting Wrenches

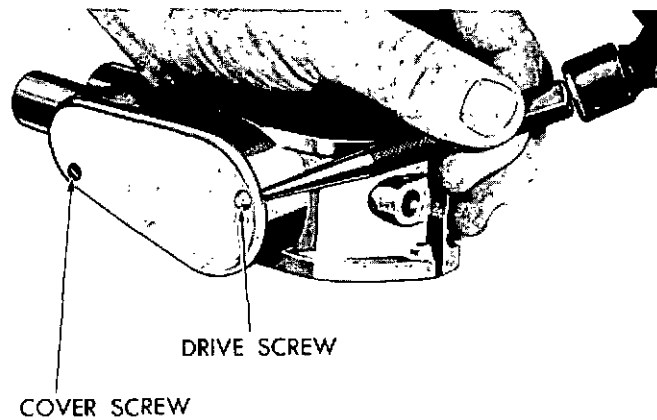
#### KING-SEELEY CALIBRATION:

If the control spring should for any reason be disengaged from the adjusting screw, or the relationship of the adjusting screw and calibrating nut changed by someone not familiar with the governor, it will be necessary to go over the complete calibration for the particular governor to insure efficient control.

Remove seal and adjust screw cap. Remove cover screw and force out drive screw, as indicated on Figure 49. Do not use a screw driver or similar tool, as it will result in damage to the housing or cover. When the drive screw is out far enough so that side cutting pliers can be applied under the screw head, turn the screw out counter-clockwise.

Position the adjusting screw in the spring until the open coils correspond to the number indicated on the "Calibration Specification" sheets for the particular governor, and it may in some cases be necessary to move the calibrating nut several turns to provide sufficient space between the end of the spring and governor housing to obtain the correct number of open coils.

Referring to Figure 51, the active coils of the control spring end where the spring contacts the thread of the adjusting screw at Point "A". Each turn of the adjusting screw adds or subtracts one coil. As an example: To obtain  $10\frac{1}{4}$  coils, turn the adjusting screw until there are 10 active coils between zero point and point "A", and then add  $\frac{1}{4}$  coil by turning adjusting screw counter-clockwise  $\frac{1}{4}$  turn.



50x204

Figure 51 — Removing King-Seeley Governor Housing Cover

When the adjusting screw is positioned to provide the correct number of active coils, hold the adjusting screw and turn the calibrating nut in the direction required with the A-24283 wrench until dimension "B" (Figure 52) indicated on the "Calibration Specification" sheets for the particular governor is provided. This measurement is from the center of the last spring coil to the inside of the governor housing, as indicated on Figure 52.

This will usually provide a setting within a few hundred revolutions of the maximum governed engine speed recommended for a particular model. However, further adjustment may be required after the governor is installed on the engine to obtain correct control and governed maximum speed. Perform any changes necessary, according to the instructions outlined under the subject of "Adjustments".

Lead type seals are recommended for the governor adjustment, inasmuch as it is possible to lock the lead type seals with a particular symbol which prevents tampering, as any change in the seal would be readily noticeable. While the patented type seals are easier to use, they offer but little protection, inasmuch as they can be easily purchased, enabling the operator or mechanic to change the adjustment and reseal the governor to avoid detection.

Generally, it is not economical to attempt major governor repairs in the average shop, as mechanics are seldom familiar with this type of work.

**NOTE: For adjustment of Hoof brand velocity or mechanical governors, refer to Hoof Service Manual.**

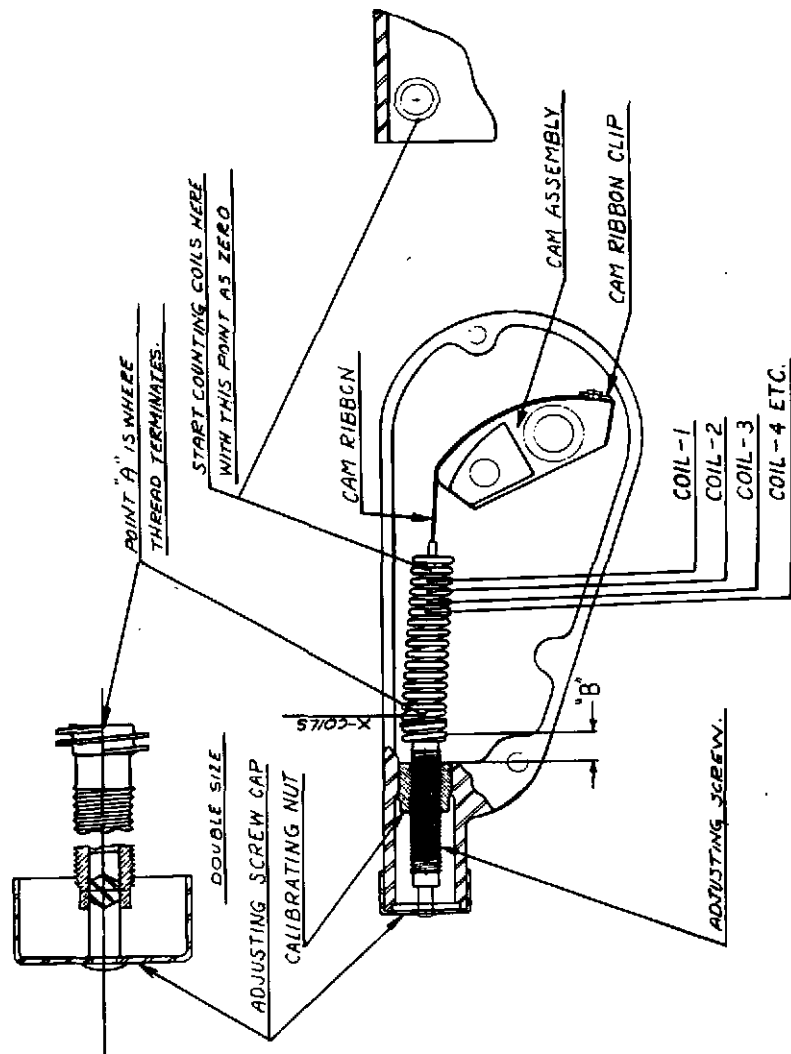


Figure 52 — Control Spring Calibration Detail (King-Seeley)

#### **STARTER PINION ADJUSTMENT:**

When the starter solenoid is energized to engage the starter pinion, there should be .015 to .030 inch clearance between the pinion and the pinion thrust washer, in order to prevent binding or jamming of the pinion. An accurate measurement of clearance can be made only when the solenoid is holding the pinion in the engaged position. For this reason, do not rely on a measurement made when holding the solenoid plunger in by hand.

**PROCEDURE:** Remove the starter from the engine. Detach the strap connecting the solenoid to the starting motor terminal. Connect a 12-volt battery to the frame of the starting motor (ground) and to the starter solenoid battery terminal.

Connect a jumper wire from the solenoid relay ground terminal to the starter frame. Connect another jumper wire from the starter switch terminal of the relay to the solenoid battery terminal (this wire energizes the solenoid). Push the solenoid plunger into the engaged position; the energized solenoid will hold the plunger in position. Measure the clearance between the pinion and the pinion thrust washer. If the clearance is not within the specified limits (.015 to .030 inch), remove the cotter pin and link pin that attaches the pinion yoke to the solenoid plunger and turn the plunger stud in or out the required distance to provide proper clearance.

#### **FAN AND ALTERNATOR BELT ADJUSTMENT:**

Fan belts that are adjusted too tightly will cause rapid wear of the alternator bearing and the water pump bearing. A loose fan belt will slip and wear excessively, causing overheating and unsteady alternator output.

(1) To obtain a satisfactory belt adjustment, loosen the alternator mounting bolts and the adjusting strap bolt.

(2) Tighten the belt by pulling the alternator out and away from the engine. If properly adjusted, the belt can be depressed  $\frac{3}{8}$ " from a straight line between the two pulleys. Do not over tighten!

(3) Tighten the alternator adjusting strap bolt and the mounting bolts.

#### **POWER TAKE-OFF, WITH HEAVY DUTY CLUTCH**

The clutch must be properly adjusted to prevent slippage, which causes rapid wear of the clutch facings and distortion of

the plates. Frequency of adjustment is determined by the amount and nature of the load. Heavy or shock loads necessitate frequent clutch adjustment to compensate for wear.

#### **CLUTCH ADJUSTMENT:**

The clutch requires adjustment when it does not pull, when it heats, or when the shifting lever jumps out. To adjust the clutch, remove the name plate, loosen or remove the positive type lock, and turn the adjusting ring in the direction indicated on the name plate. No special tools are required. The adjusting ring should be turned until a distinct lock is felt when the shifting lever is moved. Adjust the clutch just enough to pull the load without the clutch slipping.

A new clutch requires several adjustments until the friction surfaces are worn in. Do not let a new clutch slip—this may ruin the friction surfaces.

## **PREPARATION FOR STORAGE**

When the engine is to be stored or removed from operation for an extended period of time, the following precautions should be taken to prevent rust accumulation, corrosion of bearing and mating surfaces within the engine, and gum formation in the fuel system:

1. Drain the lubrication oil from the engine and refill with 2½ quarts of Rust Preventive Oil, which may be obtained from a reliable oil company.
2. Clean engine of dirt and oil accumulation. Touch up any bare surfaces that may rust.
3. Clean off electrical components.
4. Drain the fuel tank and operate the engine until the carburetor runs dry.

NOTE: The purpose of this operation is to aid in preventing the carburetor from being contaminated with gums that normally form in the gasoline as a result of its prolonged exposure to the oxygen in the air. Failure to take this precaution generally results in carburetor flat spots or other carburetor malfunctioning.

5. Remove the spark plugs and pour two ounces of rust preventive oil into each spark plug opening. Turn the engine over four or five revolutions with the starting motor to distribute the rust preventive oil on the cylinder walls and install the plugs.
6. Remove the cylinder head covers, and using a clean paint brush, coat the rocker arms, the rocker arm shafts, the valve springs, the push rods, and the valve stems with special rust preventive oil.
7. Drain the cooling system, including both sides of engine block.
8. Remove the carburetor air cleaner, the oil filler pipe air cleaner and the outlet ventilator pipe cleaner. Seal the openings with masking or adhesive tape. Also, seal the exhaust outlet opening in the exhaust manifold or exhaust pipe.
9. Replace the element in the oil filter after cleaning the filter housing.
10. Remove the storage battery and store in a cool, dry place. Replenish the water in the battery cells to cover the plates  $\frac{3}{8}$  inch. See that the battery is fully charged and keep it fully charged during the idle period.
11. Protect the engine with a waterproof cover if it is exposed to the weather.
12. Make periodic inspections to see that the engine is properly stored and that all seals are intact.
13. The Rust Preventive Oil should be drained prior to putting the engine back into operation. The crankcase should then be filled with the recommended engine oil for the operating conditions being encountered.
14. If engine is to be stored for prolonged periods, repeat item 5 every 3 months using 1 ounce of rust preventative oil in each cylinder.

# ORDERING OF PARTS

The exploded views shown in this book are intended to enable the operator to better understand the general construction of Chrysler Industrial Engines, and to assist in ordering parts.

The views are helpful in determining the sequence of assembly and function of the various parts. Therefore, they will be of considerable assistance when making adjustments or repairs.

## IMPORTANT

Orders for parts should be placed with the nearest Authorized Dealer. Authorized Dealers are in possession of complete parts information and can, in most instances, promptly supply your parts requirements from their inventory. If you do not know the location of your nearest Chrysler Industrial Engine Dealer, a card addressed to the INDUSTRIAL PRODUCTS DIVISION, CHRYSLER CORPORATION, BOX 2718, DETROIT, MICHIGAN 48288, will bring you his name and address promptly.

Most important in ordering parts is the proper identification of the engine. Always mention the Model, Type and Serial Number. (Sample: Model Ind. LH-318, Type 517, Serial Number 39540.) This information is stamped on the identification plate (located on the rear side of the left cylinder head) and should be mentioned in all parts orders or communications. The number stamped on the front end of the cylinder block just back of the water pump is a manufacturing code and should not be used for the purpose of identification.

# ENGINE TUNE-UP SPECIFICATIONS

Distributor Point Gap (Breaker Point Type) .....	.014 to .019"
Distributor Point Dwell (Breaker Point Type).....	28 to 32°
Firing Order .....	1-8-4-3-6-5-7-2
Idle Speed .....	550-600 RPM
Initial Spark Advance: as shown on individual engine specification sheet	
Recommended Fuel.....	Reg. Grade (Auto Type)
Spark Plugs .....	LH 318 ..... Champion N11Y or RN11Y MO-PAR 64PR LH 360 ..... Champion N12Y or RN12Y MO-PAR 65PR
Spark Plug Gap .....	.035"
Spark Plug Torque .....	LH 318 ..... 30 Ft. Lb. LH 360 ..... 30 Ft. Lb.
Valve Lash (Intake & Exhaust) .....	Hydraulic Tappets
Distributor — Electronic Ignition:	
Air Gap .....	.006"
For procedure, see page 63 adjustments.	

**NOTE: For all service and diagnostic procedures, see appropriate service manual.**

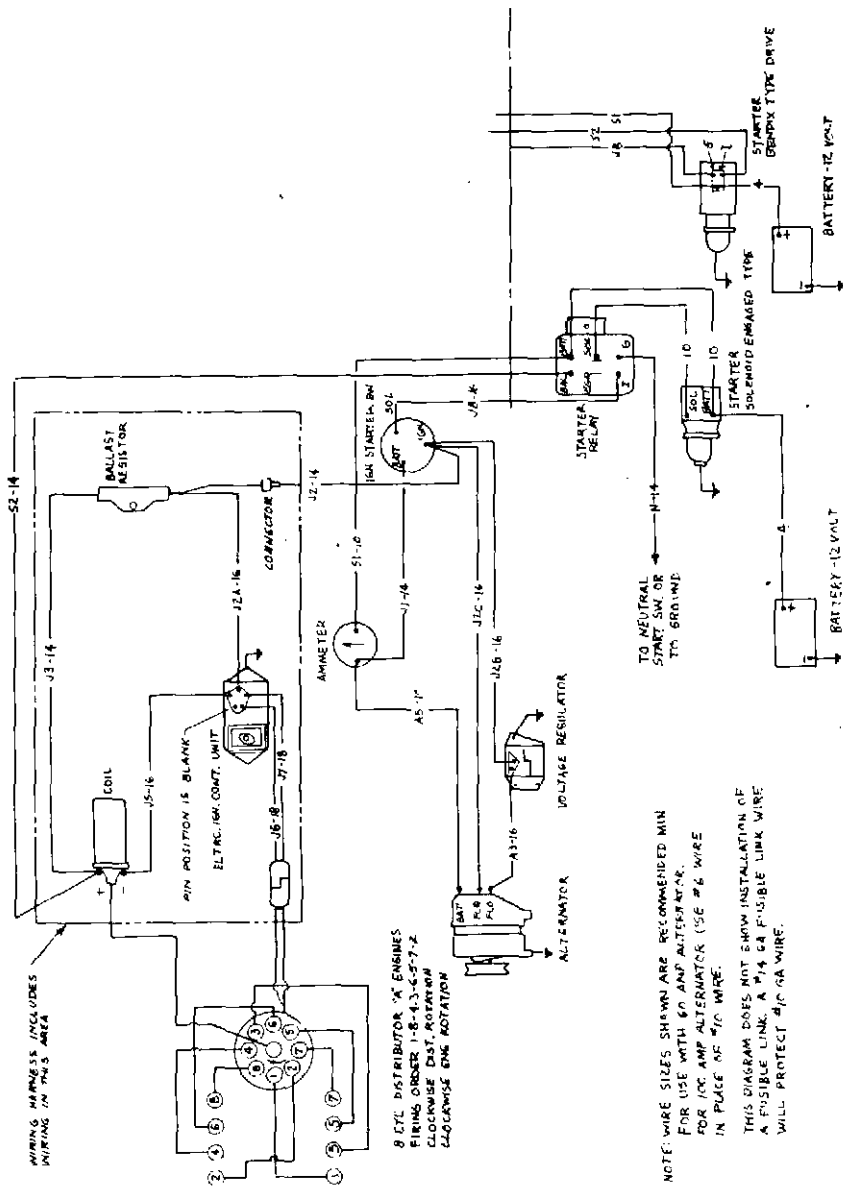
# SPECIFICATIONS

Make .....	Chrysler V-8 Industrial Engines	
Model .....	LH318	LH 360
Type .....	4 Stroke Cycle Gasoline	4 Stroke Cycle Gasoline
Cylinders .....	90° V-8	90° V-8
Bore .....	3.91 In.	4.00 In.
Stroke .....	3.31 In.	3.58 In.
Piston Displacement .....	318 Cu. In.	360 Cu. In.
Gross Horsepower Rating .....	187 @ 4000	200 @ 4000
Compression Ratio .....	8.6:1	8.5:1
Compression Pressure with warm engine, spark plugs removed and full charged battery		
@ 150 RPM .....	100 PSI Min.	100 PSI Min.
<b>Maximum Variations</b>		
Between Cylinders .....	40 PSI	40 PSI
Cylinder Numbering as Viewed from Flywheel End of Engine		
(Left Bank) .....	1-3-5-7	1-3-5-7
(Right Bank) .....	2-4-6-8	2-4-6-8
(Firing Order) .....	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Oil Pressure (Operating at 2000 RPM) .....	30-70 PSI	30-70 PSI
Oil Pressure Idling at 500 RPM (Min) .....	8 PSI	8 PSI
Crankcase Capacity .....	*6 Qts.	*6 Qts.
	5 Qts.	Front Sump Pan 5 Qts.
	5 Qts.	Rear Sump Pan

\*Add one additional quart of engine oil when filter element is changed.







NOTE: WIRE SIZES SHOWN ARE RECOMMENDED MIN FOR USE WITH 60 AMP ALTERNATOR. FOR 100 AMP ALTERNATOR USE #6 WIRE IN PLACE OF #10 WIRE.

THIS DIAGRAM DOES NOT SHOW INSTALLATION OF A FUSIBLE LINK. A #14 GA FUSIBLE LINK WIRE WILL PROTECT #10 GA WIRE.

Wiring Diagram — Electronic Ignition (Single Element Ballast Resistor)

INDUSTRIAL PRODUCTS DIVISION



CHRYSLER  
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