AUTOMOTIVE CARBURETION

Made Easy

- BASIC CARBURETION
- SERVICE HINTS
- IMPORTANCE OF ADJUSTMENTS
  - ON THE BENCH
  - ON THE ENGINE

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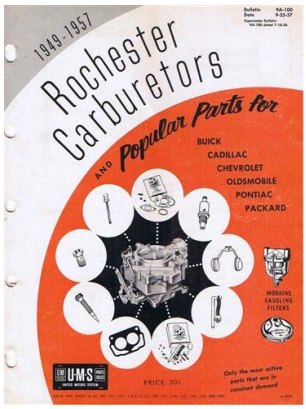

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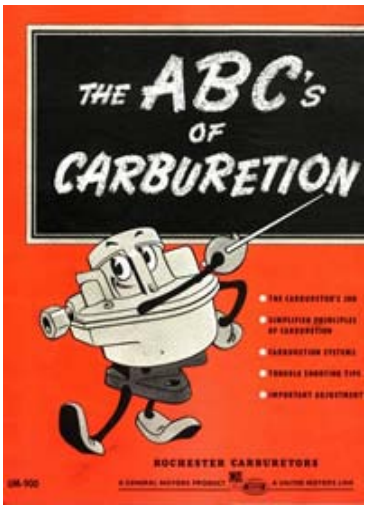

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Automotive Carburetion Made Easy

UM-900 (1952)

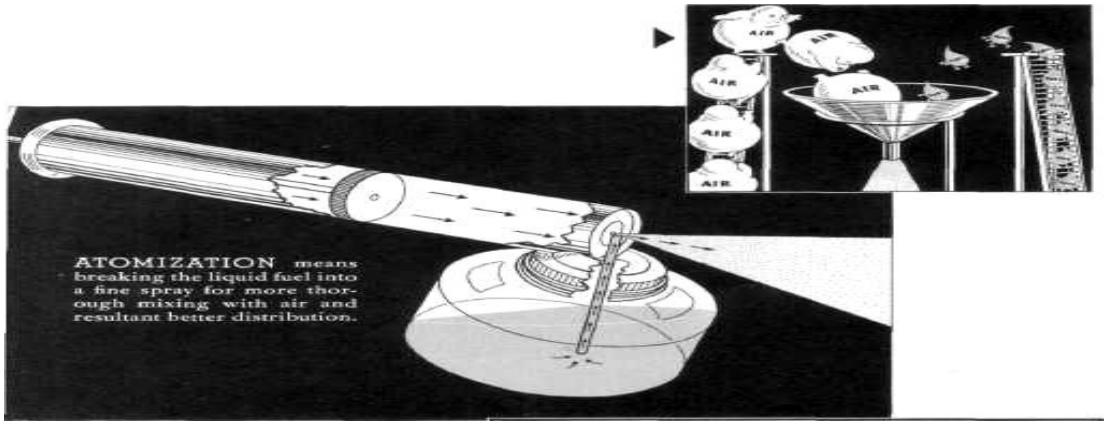
This booklet is intended to present a simplified discussion of automotive carburetion. It is in no way intended to minimize the importance of carburetion, since in modern day high compression engines, good carburetion and carburetor service are becoming increasingly important. The information contained herein will help the mechanic to understand carburetion better, and enable him to perform general carburetor service with greater confidence. For a more detailed discussion of carburetion and servicing Rochester Carburetors in particular, the interested mechanic should contact the United Motors Service Distributor in his area for school and service

BASIC CARBURETION

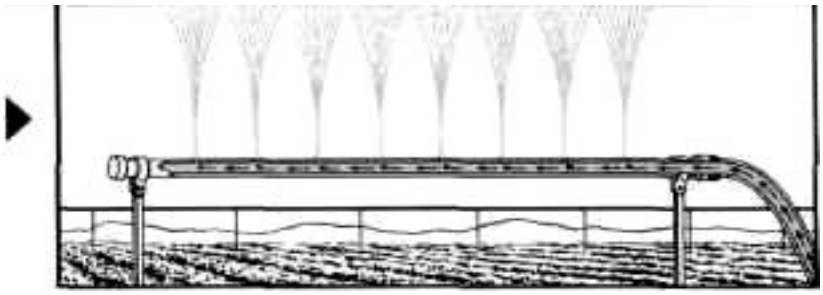
The automotive carburetor has three basic functions to perform. They are:

1. Metering;
2. Distribution;
3. Atomization.

METERING - means automatically delivering the proper amount of fuel and air to the engine under all operating conditions and speeds.



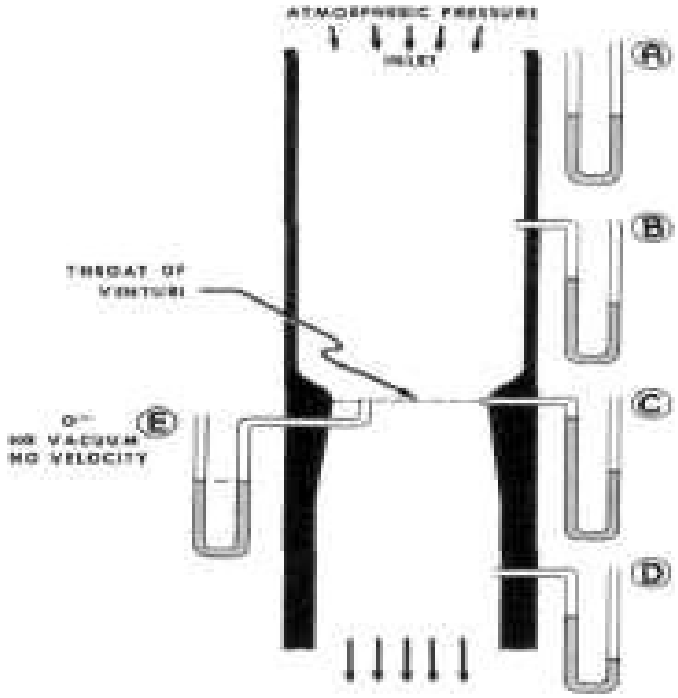
DISTRIBUTION - means an equal amount of fuel and air in each cylinder and a well distributed mixture in each combustion chamber.



BASIC CARBURETION Continued...

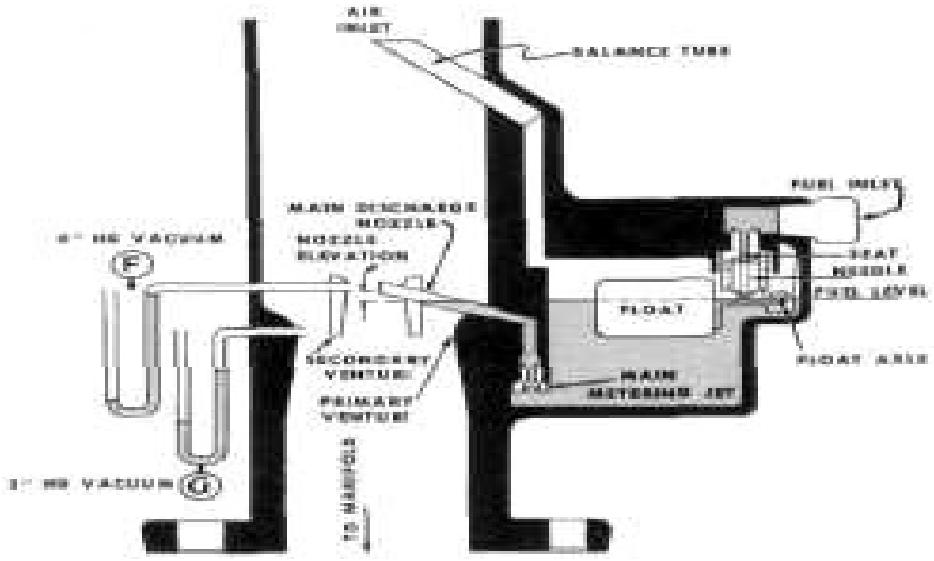
The automotive carburetor, although relatively inexpensive and easy to service, is expected to meet many demands of the car owner, such as:

1. Maximum Power
2. Economical Operation throttle maneuvers or weather conditions
3. Flexibility (e.g. altitude)
4. Smooth operation regardless of
5. Rapid Acceleration



A - O" HG VACUUM NO VELOCITY
B - 1" HO VACUUM LOW VELOCITY LAROE AREA
C - 1" HO VACUUM HIGH VELOCITY SMALL AREA
D - 2" HO VACUUM MODERATE VELOCITY MODERATE AREA

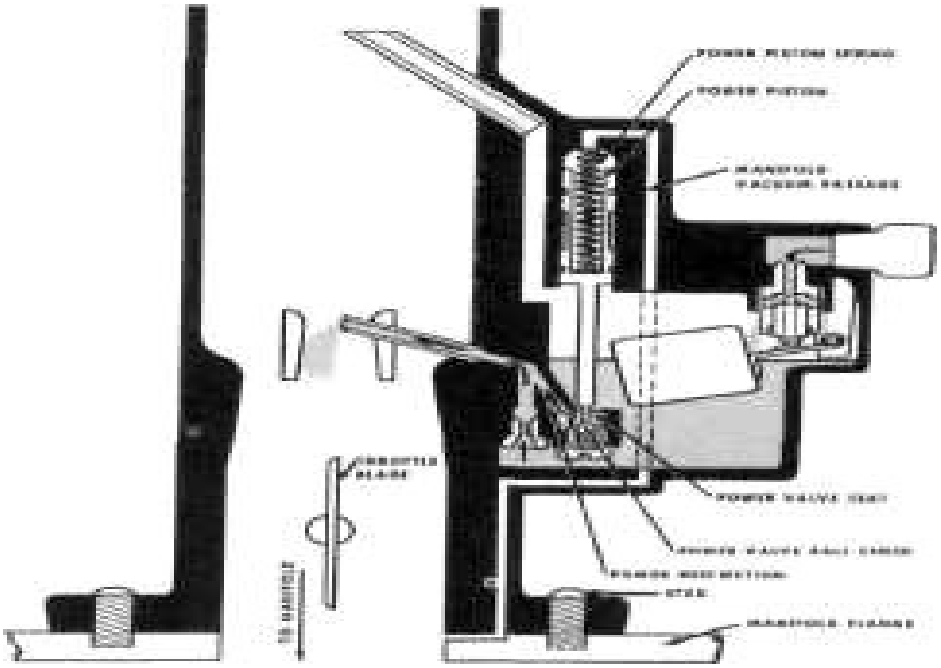
When the engine piston moves down, it creates suction in the intake manifold. Assuming that there is suction at the bottom of this pipe and atmospheric pressure at the top, air will flow through. As shown in the mercury U-tubes, the greatest suction is at the point of smallest area or highest velocity (C). Note in (E) that if the tube points into the air stream it merely transmits the pressure in the pipe to the mercury in the U-tube. We use these principles to draw fuel from a carburetor.



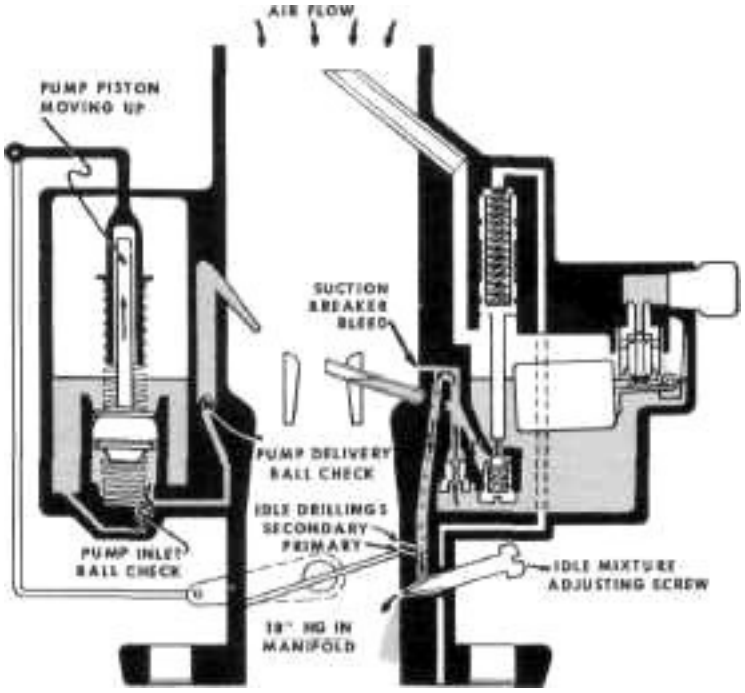
This is a simple single jet carburetor. The float mechanism maintains the fuel level in the carburetor bowl. We know that by placing one venturi inside another we can increase suction (F,G). The main discharge nozzle is located at the smallest area or point of greatest suction. As the piston speed increases and suction increases, fuel is drawn from the float bowl up through the main discharge nozzle and enters the main air stream. When the piston stops there is no suction and the fuel level drops below the tip of the nozzle, thus preventing leakage. Note that the balance tube faces directly into the air stream, and so transmits pressure to the fuel in the float bowl.

The difference in pressure between the balance tube and main discharge nozzle causes fuel flow.

BASIC CARBURETION Continued

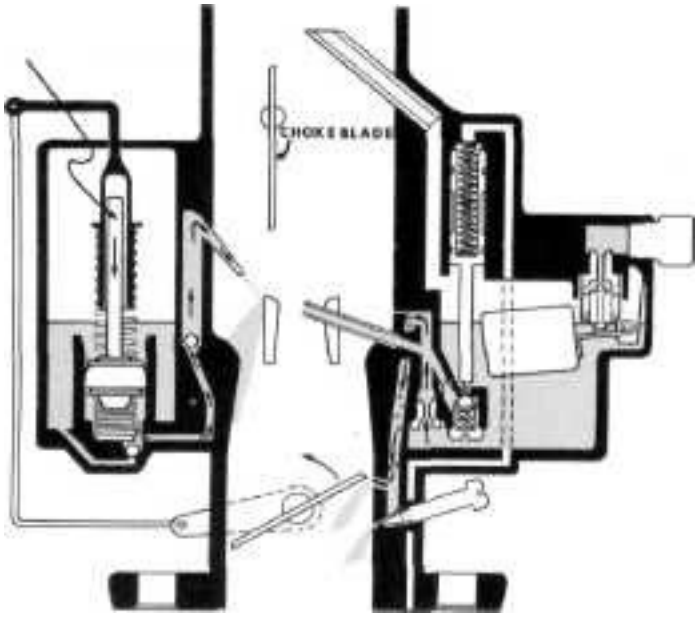


The main metering jet meters sufficient fuel for operation in the economy range. However, when more power is required, the carburetor must provide a richer mixture. In the economy range manifold vacuum holds the power piston up, thus leaving the power valve ball check on its seat. As more power is required, such as on rapid acceleration or hill climbing, the manifold vacuum drops. When this happens, the power piston spring forces the power piston down, unseating the ball check, and permitting additional fuel to flow through the power restriction into the main fuel channel.



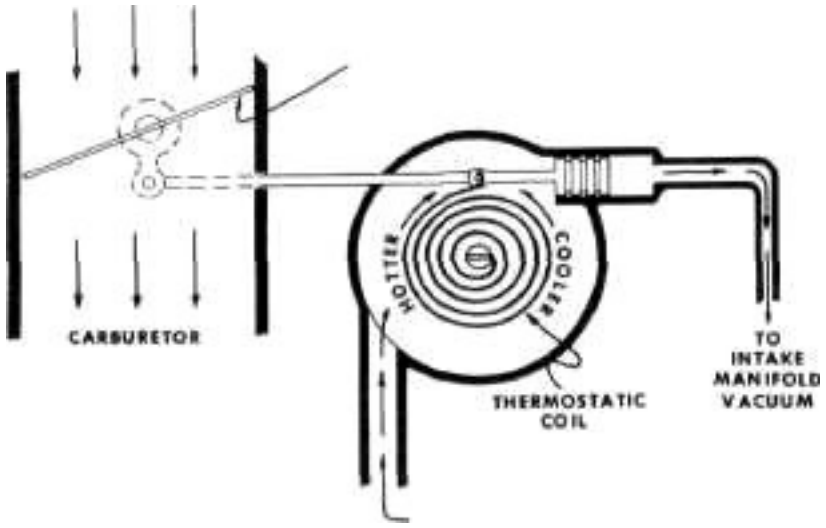
In the idle range there is insufficient suction at the main discharge nozzle to cause fuel to flow. However, the high suction in the mani-fold is utilized by drilling discharge holes in the carburetor beneath the throttle valve. A main fuel channel connects these holes to the float bowl. In the idle range these holes, under high suction, supply fuel for smooth operation. As the throttle valve is opened the suction at these holes decreases and they stop feeding fuel. The timing is such that the main discharge nozzle starts feeding fuel at the same time the idle holes stop feeding.

BASIC CARBURETION Continued



Note that in the idle range the accelerator pump is fully charged with fuel. When the throttle is suddenly depressed, air flow increases instantly. Fuel, being heavier than air, lags behind somewhat. To prevent hesittaion during this lean period the carburetor uses an accelerator pump connected directly to the throttle. As the throttle is depressed, this pump instantly sprays a charge of fuel into the air stream, thus preventing leanness. As shown in the illustration, the pump also compenpensates for a possible lag in the transfer range, when idle fuel stops and main nozzle fuel starts.

The automatic choke regulates the mixture for proper cold weather operation. The coil is bimetallic and expands or contracts with changes in temperature. As it cools it closes the choke valve, thus reducing air flow. Heat from the exhaust manifold gradually relaxes the coil tension, thus permitting the valve to open as the engine warms up. Since the automatic choke is linked to the fast idle mechanism, it also regulates the throttle position during cold starting and engine warm-up. Always depress accelerator once before starting during cold weather to as-sure proper operation of choke mechanism.



CHOKE VALVE

FROM EXHAUST MANIFOLD STOVE

Fuel vaporization may seriously disrupt carburetor operation under hot weather conditions, particularly at idling speeds. Wherever advantageous, atmospheric vents are used, thus allowing these vapors to escape from the carburetor bowl instead of passing through the carburetor metering channels.

SERVICE HINTS

Before carburetor service can be properly performed, it must be remembered that **CARBURETION IS DEPENDENT UPON COMPRESSION, IGNITION, SPARK TIMING, VALVE TIMING, ETC THE CARBURETOR SHOULD ALWAYS BE SERVICED AND ADJUSTED LAST IN AN ENGINE TUNE-UP.**

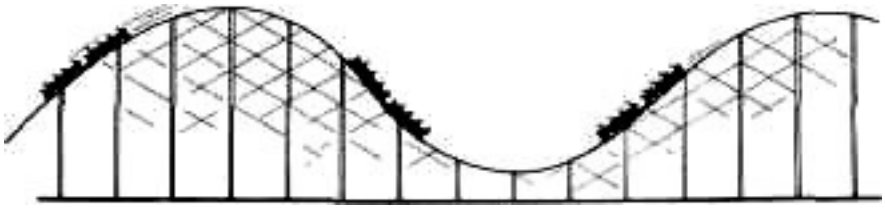
The following list may be of assistance in determining the source of carburetor trouble after the engine has been tuned:

1. IDLE SYSTEM (Rough idle, stalling)

a. Is the engine idle speed properly adjusted?

b. Are the idle channels free of carbon or obstruction?
c. Is the throttle body bore free of carbon deposit?
d. Is the engine manifold heat valve free?

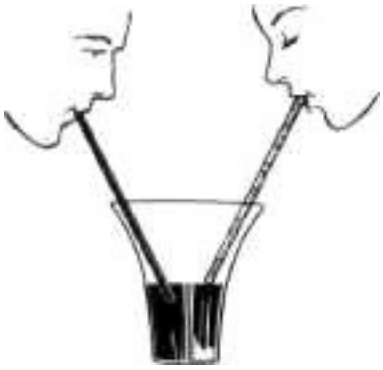
e. Are the idle adjusting needles free of burrs?
f. Is the float setting correct?
g. Is the top of the float needle smooth?



2. PART THROTTLE SYSTEM (Poor economy, surge)

a. Are the fuel channels free of dirt or obstruction?

b. Are the main metering jets of proper size and approach angle?



C. Are the main well tubes bent or loose?

SERVICE HINTS Continued

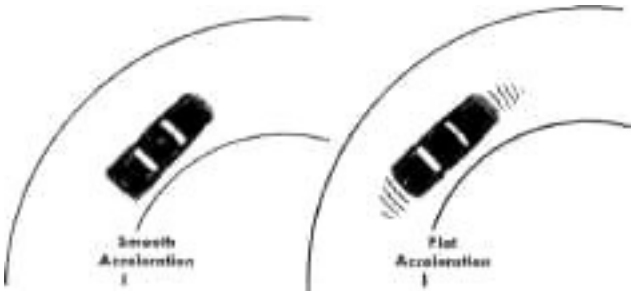
3. POWER SYSTEM (Surge, low top speed, hesitation)

a. Is the vacuum channel free of carbon or obstruction?
b. Is the power piston worn or out of round?

c. Is the power restriction free of dirt or lint?

d. Is the actuating spring stretched or distorted?
e. Do the ball checks or valves leak?

4. PUMP SYSTEM (Hesitation)



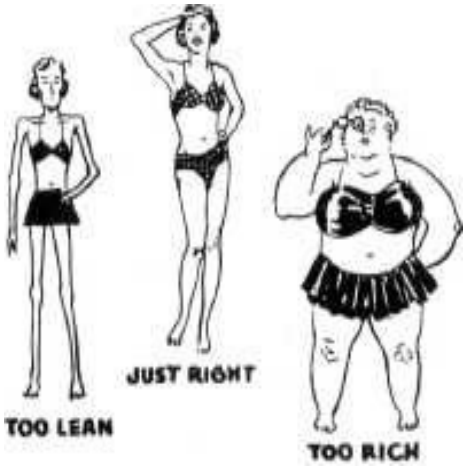
a. Is the pump leather distorted?

b. Do the inlet or outlet valves leak?

c. Does the plunger vent ball seat properly?
d. Are the channels free of dirt or obstruction?

SERVICE HINTS Continued

5. CHOKE SYSTEM (Hard starting, rough idle, stalling)

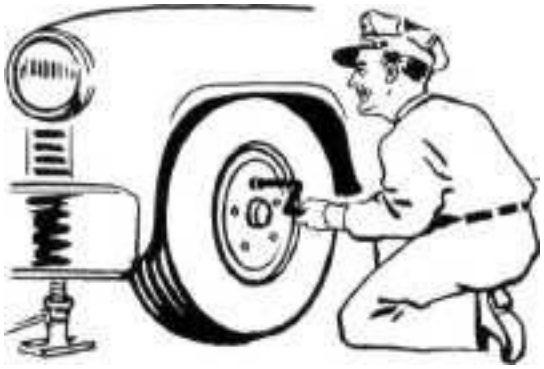


a. Is the choke cover properly indexed?
b. Are the intake and exhaust manifold channels free of air leaks or obstruction?

c. Is the choke valve free?
d. Is the choke piston free of dirt or carbon?
e. Is the fast idle engine speed properly adjusted?
f. Is the fast idle cam excessively worn?

6. GENERAL

a. Do gaskets indicate a good seal?



b. Are all screws and mounting nuts tightened evenly?
c. Are shaft holes excessively worn?

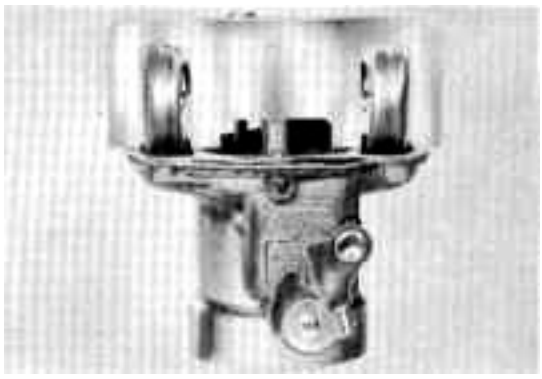
d. Are all adjustments within specified limits?

e. Does float needle seal properly to prevent flooding?

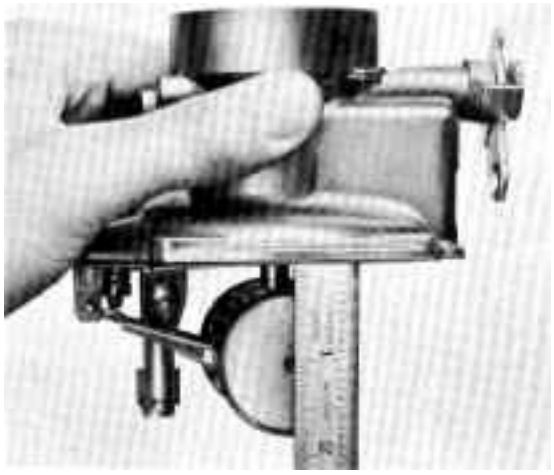
IMPORTANCE OF ADJUSTMENTS

It is the purpose of this section to explain the importance of the various recommended carburetor adjustments. For specific

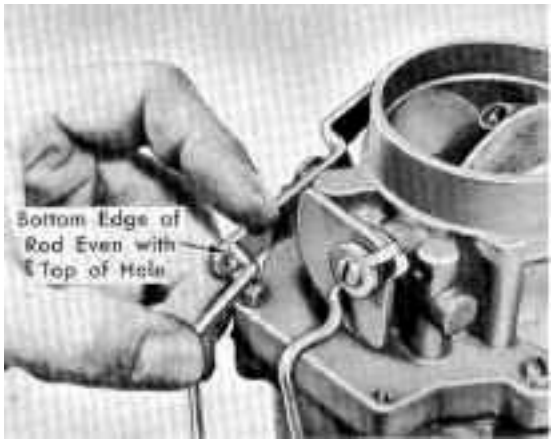
ON THE BENCH



If any one carburetor adjustment is more important than the others, it is the float setting. This setting determines the relationship between fuel level and

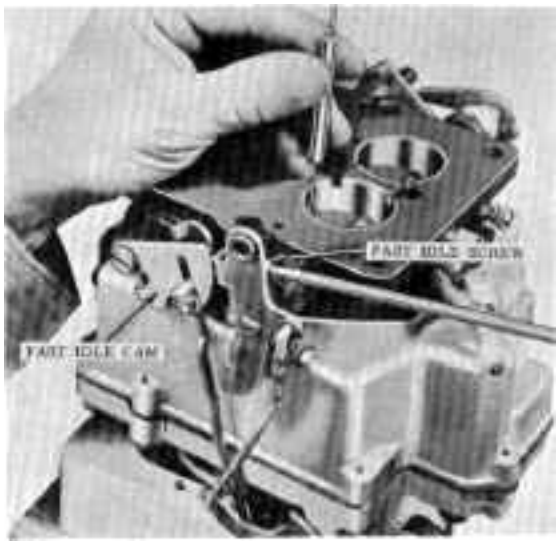


The float drop setting insures sufficient fuel for sustained high speed driving. On carburetors using a float balance spring, this setting has a definite effect on the normal fuel level, thereby making its accuracy essential. **IT MUST BE CORRECT.**



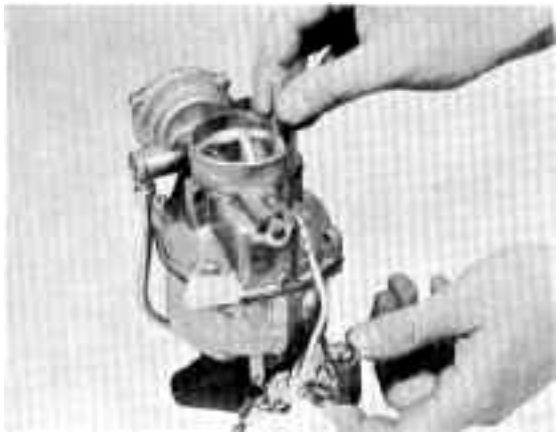
Accelerator pump action is controlled completely by throttle movement. Pump setting is made to assure proper relationship between position of pump plunger and position of throttle valve. Improper adjustment can cause flat spots and hesitation. **IT MUST BE CORRECT.**

The Choke Rod Setting plays an important part in proper fast idle speed during engine warm-up. When properly adjusted, it helps determine correct relations between choke valve opening and minimum throttle valve opening. If improperly adjusted, it can cause hard cold starting, rough idling, stalling and loading up. **IT MUST BE CORRECT.**

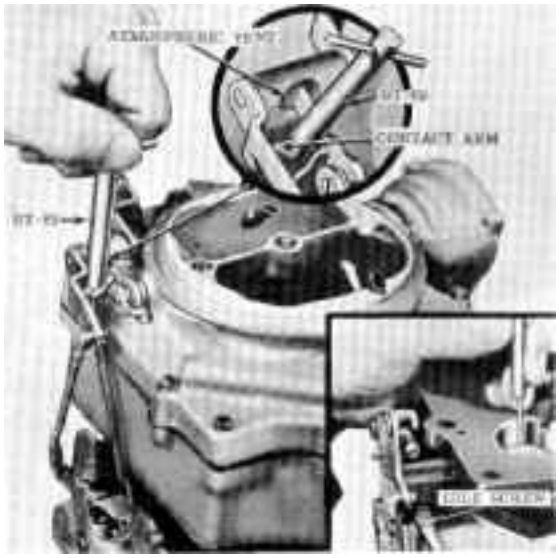


IMPORTANCE OF ADJUSTMENTS Continued

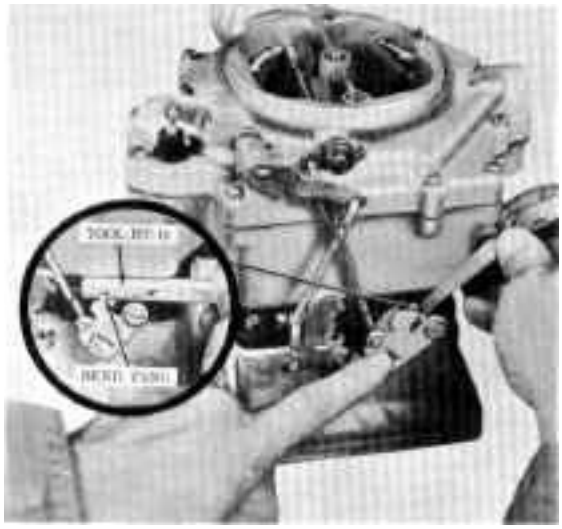
The fast idle setting is made to determine the proper engine RPM when the engine is cold and the choke valve is partially closed. If possible, this setting should always be checked on the engine. If improperly ad-justed, it can cause stalling or loading up during engine warm-up. **IT MUST BE CORRECT.**



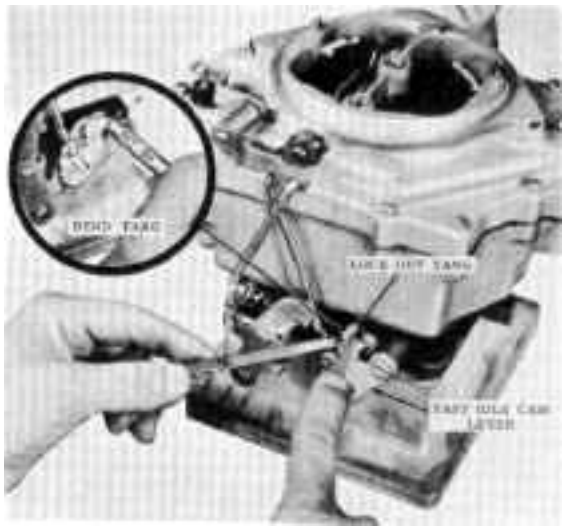
The unloader adjustment is made to prevent loading up on a wide open throttle accelera-tion during the warm-up period. This is accomplished by the throttle movement mechanically forcing the choke valve partially open to admit more air. If improperly adjusted, excessive richness and loading may result. **IT MUST BE CORRECT.**



The atmospheric idle vent adjustment on GM 4-Jet models is made to facilitate smooth idling, especially when hot. With the throttle valves in the slow idle position, this vent valve is held open to allow fuel vapors to rise and pass off. It must close immediately as the throttle valves are opened to prevent atmospheric venting. If improperly adjusted it may cause rough idling when hot or poor mileage in the economy range. **IT MUST BE CORRECT.**



The secondary lock out adjustment on GM 4-Jet models prevents the secondary throttle valves from opening during engine warm-up. It holds secondary valves closed, allowing primary valves to open fully against tension of override spring. If improperly adjusted, it may cause flat acceleration during warm-up or a bind in automatic choke action. **IT MUST BE CORRECT.**



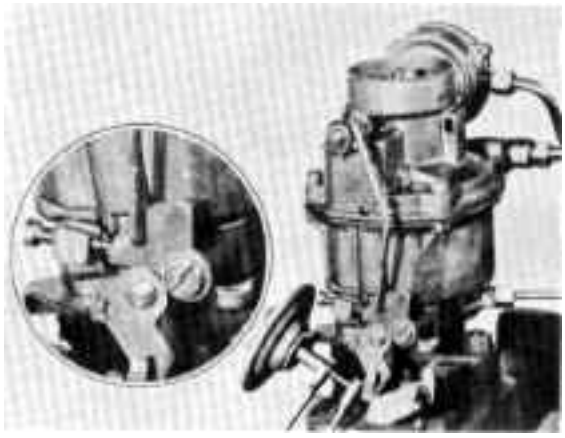
IMPORTANCE OF ADJUSTMENTS Continued

The secondary clearance adjustment on GM 4-Jet models prevents the secondary throttle valves from opening until the choke valve is wide open. If improperly adjusted, it may result in flat acceleration during warm-up or a bind in the action of the secondary throttle valves. **IT MUST BE CORRECT.**

ON THE ENGINE

SLOW IDLE-The slow idle setting is an important factor in smooth idling and stalling after engine warm-up. It should be adjusted carefully according to factory specifications with the use of a tachometer and vacuum gauge.

FAST IDLE-The final fast idle adjustment should always be made on the engine with the use of a tachometer. Adjust according to factory specifications. If improperly adjusted, it may result in hard starting when cold, stalling or loading up.



AUTOMATIC CHOKE STOVE - Rochester Automatic choke carburetors for Chev-rolet application require the use of a choke stove assembly and heat pipe. For proper choke operation, this stove must be properly installed. Install on forward side of exhaust manifold. Do not insulate steel heat pipe. The recommended installation gives best results with factory calibrated parts.

TOOLS and GAUGES

TYPICAL GAUGE KIT FOR SERVICING ROCHESTER CARBURETORS

Since service adjustments on all models of Rochester Carburetors have been kept to a minimum, the number of special tools and gauges required for field service adjustments are comparatively few. The necessary tools and gauges are available, in compact kits, through United Motors Service Distributors everywhere.

CAUTIONS

1. The practice of indiscriminately installing lean main metering jets to improve economy is without basis. Lean jets are intended for high altitude use only and will not improve mileage at average or sea level altitudes. Excessively lean jets may result in burned engine valves.

2. Mileage complaints should always be verified with a gas-per-mile-gauge with the owner driving. Many factors, other than carburetion, affect mileage.

3. As mentioned before, **CARBURETION SHOULD ALWAYS BE CHECKED LAST IN ENGINE TUNE-UP**.

4. Do not remove throttle valves or shafts from Rochester Carburetors. All idle drillings are made with relation to a proper fitting valve. Since removing and replacing the valve will change this relationship, rough or erratic idling may be the result.

5. Be certain all carburetor adjustments are made in proper sequence according to factory specifications.

6. Always remember **- DIRT IS A CAR-BURETOR'S WORST ENEMY.** A good cleaning job will often result in a satis-fied customer. Always remove gum de-posits with a good gum solvent. In many instances it may be advisable to install a fuel filter to minimize dirt deposits.