



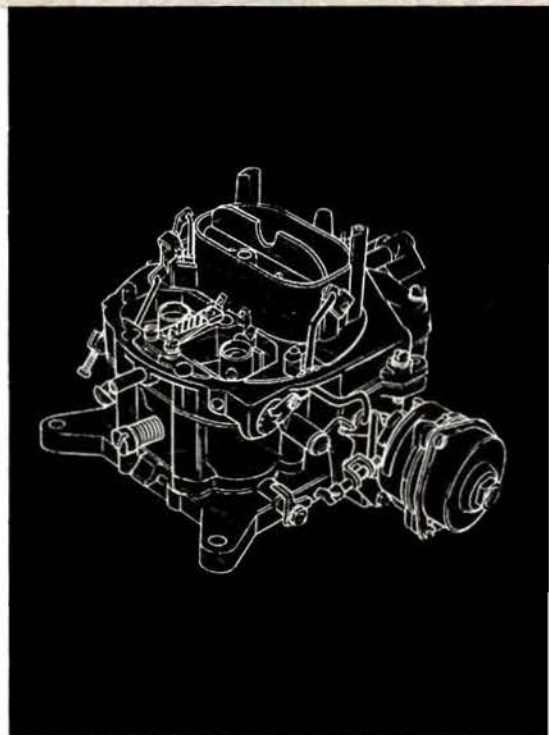
TRAINING HANDBOOK 9503.1, 9503.2

Autolite Model 4300 CARBURETOR

Operation, Adjustment and Overhaul



VOL. 67 S2 L2



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Training Handbook 9503.1, 9503.2; Vol. 67 S2 L2**

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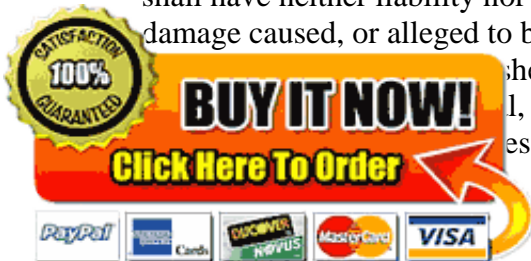
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AUTOLITE MODEL 4300 CARBURETOR

Operation, Adjustment and Overhaul

TRAINING HANDBOOK 9503.1, 9503.2 VOL. 67 S2 L2

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The descriptions, testing procedures, and specifications in this handbook were in effect at the time the handbook was approved for printing. The Ford Motor Company reserves the right to discontinue models at any time, or change specifications without notice and without incurring liability.

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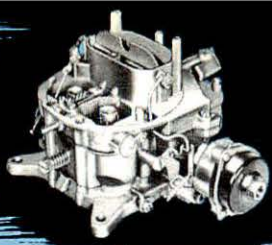
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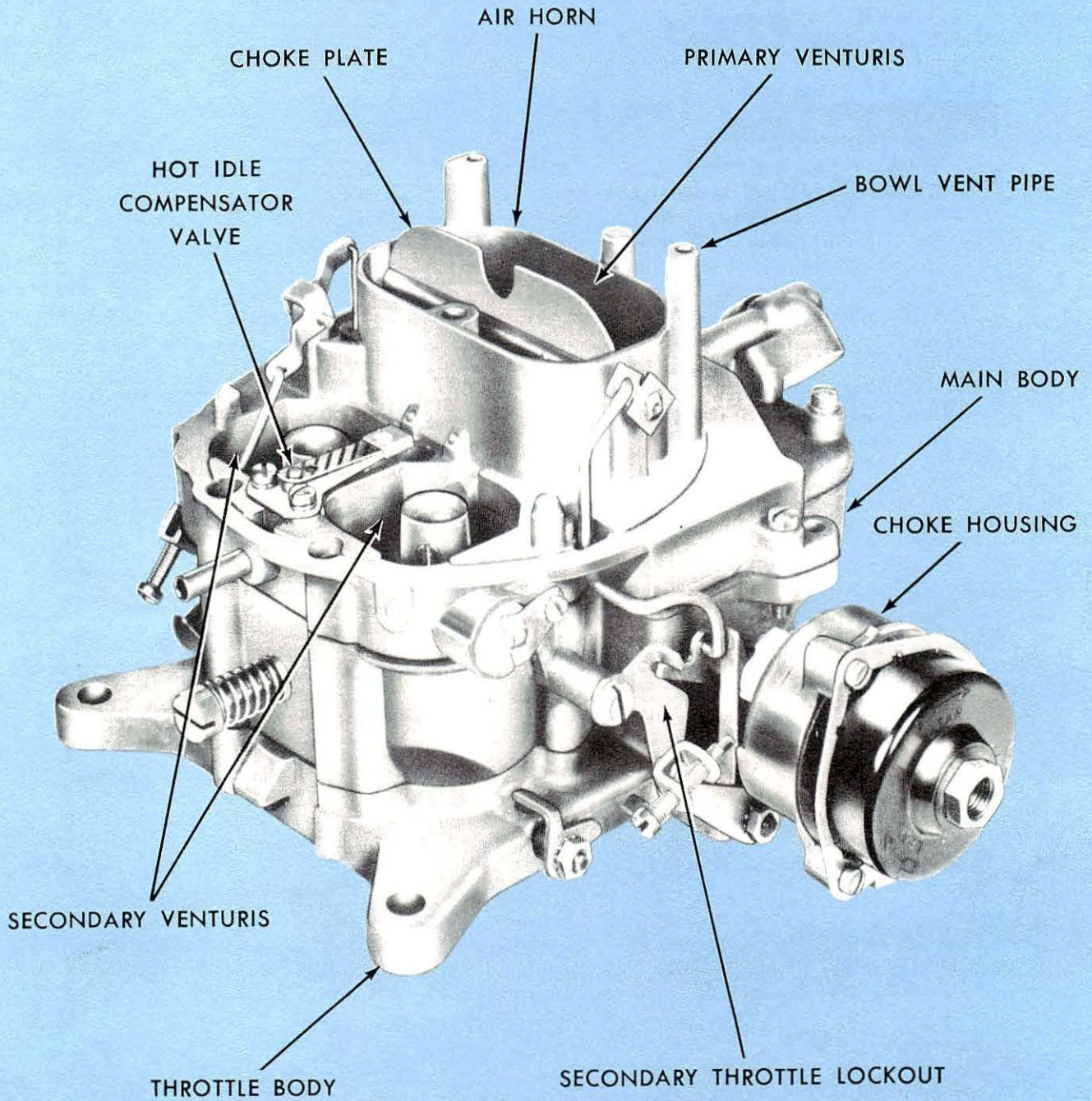
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INTRODUCTION

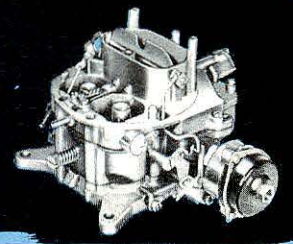


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INTRODUCTION



The Autolite Model 4300 (Fig. 1) is a four-venturi (barrel) carburetor that operates in two stages. The two primary barrels provide fuel-air mixtures for most operating conditions. Two secondary venturis are timed to furnish additional fuel-air mixtures when the primary throttles are three-quarters open.

DESIGN CHARACTERISTICS

This carburetor design was adopted with the following objectives in mind:

- Adaptability to quality production.
- Acceptable hot fuel handling, hot restarts, and idle stability.
- Improved cornering performance.
- Reduced effect of dirty air cleaners on fuel economy.
- Compatibility with exhaust emission control systems.
- Improved choke operation.

Mounting and air cleaner flange dimensions are the same as on previous Ford four-venturi carburetors. When the Model 4300 is mounted on existing four-venturi intake manifolds, the throttle bores will be on the same centers.

CARBURETOR SYSTEMS

A single fuel inlet system serves both the primary and secondary venturis. The system has one bowl



and a dual-pontoon float to control the fuel level through a conventional inlet valve (needle-and-seat). An auxiliary inlet valve also is provided to assist filling the bowl when the carburetor is handling hot vapors and for maximum engine demands.

Each of the two primary barrels has its own **idle system** and **main metering system**. The **accelerating pump** is a piston type, and discharges fuel into the primary venturis when the throttle is opened.

One valve-type **power fuel supply system** provides added fuel to the main venturis when the engine operates under a load.

The **automatic choke system** serves the primary venturis only and prevents the secondaries from operating when the engine is cold. Exhaust manifold-heated air is directed to the thermostatic spring which controls the choke plate position. The choke pulldown device is a vacuum-operated piston in the choke housing.

Spring-loaded, offset air valves are incorporated in the **secondary main metering systems** to control air and fuel delivery to the secondary barrels. The secondary throttle plates are linked mechanically to the primary throttle linkage through an over-travel spring. The spring permits the primary throttles to open fully when the choke linkage has the secondaries "locked out."

A **balanced vent system** is used; that is, the bowl is always vented to the air horn so that pressure drop through the air cleaner doesn't upset the calibration of the fuel supply systems (Fig. 2). An additional vent is provided to vent the bowl to the atmosphere at idle or very low-rpm operation . . . when vaporization is likeliest to occur in the bowl.

Another special feature of the Model 4300 is a **hot idle compensator system**. The compensator is thermostatically operated to add air to the idle mixture when the carburetor inlet temperature is high.

CONSTRUCTION

The carburetor is built in three main assemblies—the upper body or air horn; the main body; and the lower throttle body.

In the **air horn** are contained the accelerating pump linkage, the fuel inlet valves and float, the power valve piston and spring, the choke plate, the booster venturis, the secondary barrel air valves and the hot idle compensator valve.

The **main body** contains the main metering jets, the accelerating pump piston, well, discharge valve, the power valve, fuel passages for the various systems and the idle air adjustment screw.

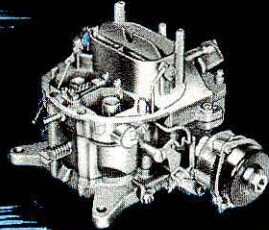
The **throttle body** contains the throttle plates and linkage, the idle fuel adjustment needles and the automatic choke assembly.



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OPERATION

HANDBOOK SCOPE

In the sections that follow, we shall discuss the operation of each of the systems in the 4300 Carburetor, and then go through diagnosis, adjustments and overhaul. Basic carburetor principles will not be covered; that information is in your training handbook entitled "How the Fuel System Operates"—Course 9500.1, and can be reviewed if you happen to be "rusty" on carburetor operation. This handbook will give you the complete story of the Model 4300 Carburetor, building on your basic fuel system knowledge.

Definitions of technical terms appear at the end of the book.

OPERATION

The Model 4300 Carburetor is designed to supply a calibrated fuel-air mixture to a V-8 engine. In normal operation, each of the primary venturis supplies all the fuel-air mixture required by four cylinders. The idle, main metering, power fuel supply, accelerating pump and choke systems go into operation automatically to provide the proper richness or leanness of the mixture for the operating condition.

Operation of the fuel metering systems is controlled by the accelerator linkage, throttle position and engine speed. The choke system, of course, is controlled by the throttle position and the temperature of the engine exhaust manifold.

While there is interaction between the various carburetor systems, operation is best understood by considering the systems individually. Let us, then, look at the operation of each system, beginning at where the fuel enters the carburetor.

FUEL INLET SYSTEM

Correct calibration of any carburetor depends on fuel being available at a specific level in the fuel bowl. If the fuel level is low, the metering systems deliver lean mixtures; if the level is high, mixtures are rich. The function of the fuel inlet system is to admit gasoline into the fuel bowl and maintain the specified level.

Figure 3 shows the construction and operation of the fuel inlet system. The **fuel inlet** is constantly charged with fuel under pressure from the fuel pump. This fuel enters the bowl through the **fuel valve**, which is permitted to open when the

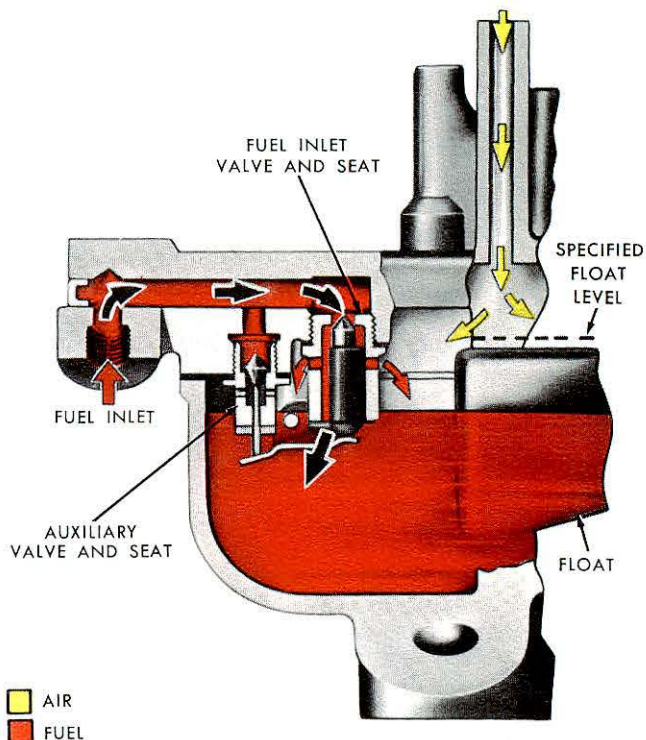


Fig. 3—Fuel Inlet System

its seat. Flow of the fuel into the bowl then is blocked until some fuel is used and the float lowers again.

Auxiliary Fuel Inlet Valve

An **auxiliary fuel inlet valve** is built into this system to supplement the main or primary fuel inlet valve when engine fuel requirements are high.

The main or primary fuel inlet valve controls small fuel flows precisely because of its small area of opening and relatively high valve-to-seat sealing pressure. When large fuel flows are required, as in high engine speeds and heavy-load conditions, the fuel level and float height drop, thereby opening the auxiliary valve (Fig. 4) in addition to the main or primary fuel inlet valve. The total combined fuel valve opening is larger than the previous single valve that has been used in former Ford carburetors.

In addition to supplying fuel for high engine load conditions, the large combined valve opening also purges the carburetor-to-fuel pump line, after a hot restart, of fuel vapor that forms during a hot soak condition.

Venting the Bowl

Two stand pipes beside the air horn (Fig. 3) vent the bowl to the fresh air inlet. The stand pipes



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with the fuel level. fill the bowl to enough for the (needle) against



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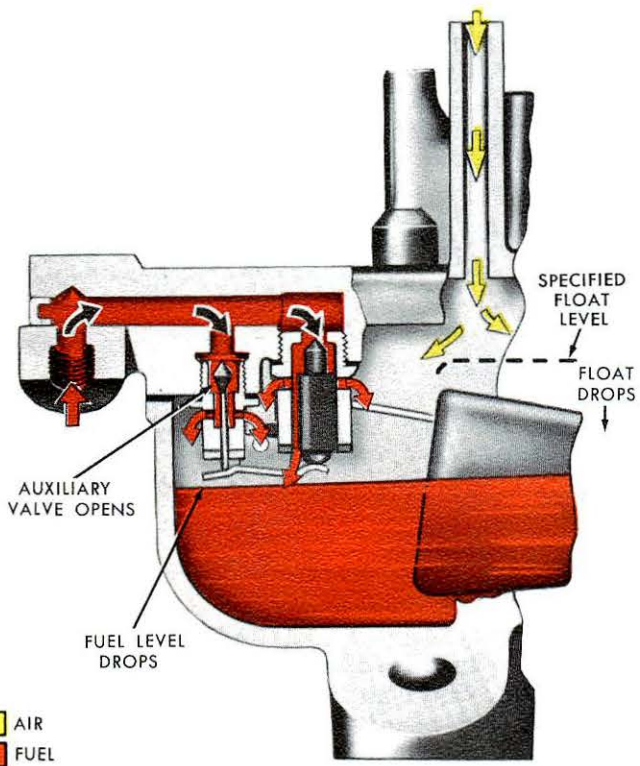
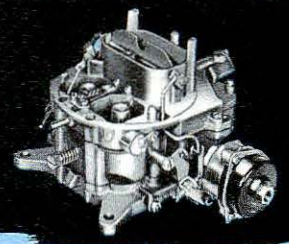


Fig. 4—Auxiliary Fuel Valve Operation

are open to the carburetor intake air after the air passes through the air cleaner. Thus, the bowl pressure and air horn pressure are equal during main metering system operation, and the calibration of the carburetor isn't affected by the air cleaner's condition.

An external vent valve (Fig. 5) is opened by a lever actuated by the accelerating pump linkage when the throttle is closed, or nearly closed. This



valve provides relief during periods of idle and part throttle operation when vapor is likely to form in the bowl.

IDLE FUEL SUPPLY SYSTEM

When the throttles are closed or nearly closed, there is not enough air flow through the venturis to create the vacuum needed to operate the primary main metering system. Therefore, we have a separate fuel metering system for idle operation.

The primary idle fuel supply system (Fig. 6) uses the pressure difference between manifold vacuum and atmospheric pressure in the bowl to cause fuel flow. Idle system fuel flow is from the bowl, through the main metering jets and into the main wells. From there, the fuel flows up through calibrated restrictions in the **idle tubes**, then down the idle channels to the idle cavities in the throttle body. It enters the venturis below the throttle plates through the idle discharge port and idle transfer slot. The idle fuel adjustment screw regulates the amount of fuel that is discharged through the port.

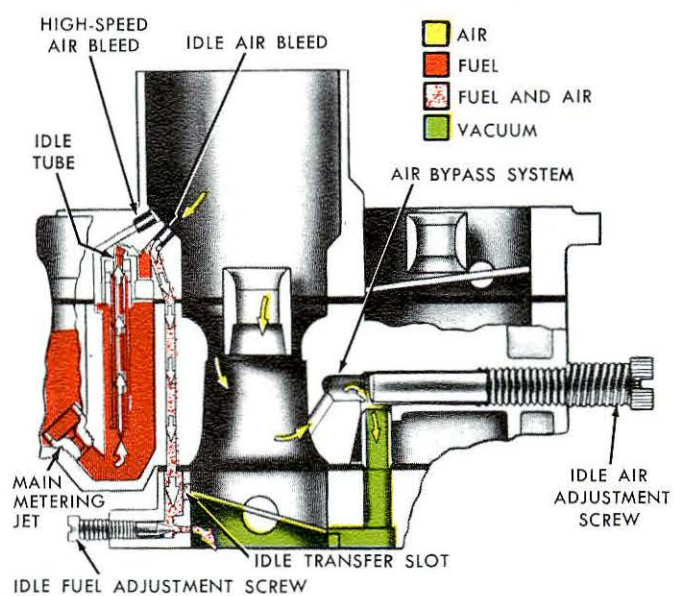


Fig. 6—Idle Fuel Supply System

Air Bleeds

Filtered air is mixed with the fuel through the idle air bleeds to help the fuel atomize as it is discharged. The bleed also prevents siphoning through the idle system at very high speeds, or when the engine is shut down.

Idle Transfer Slot

The idle transfer slot in each venturi serves both as an air bleed and as a secondary discharge port. At closed throttle (Fig. 7), the top of the slot

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admits air into the idle cavity, and the bottom of the slot delivers fuel to the venturi. When the throttle opens slightly above an idle condition, the whole length of the slot becomes a discharge port to richen the mixture (Fig. 7). This secondary discharge opening prevents the increase in air flow from making the mixture too lean. There would be a "flat spot" in the transition from the idle to the main metering system without the transfer slot.

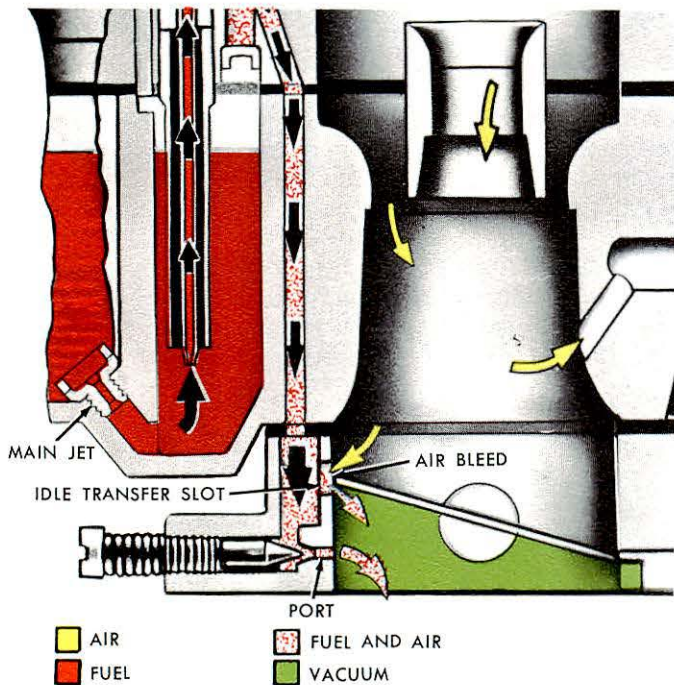


Fig. 7—Idle Transfer Slot is Secondary Discharge Passage

Idle Air Bypass System

The idle air bypass system (Fig. 6) is incorporated in the idle system. This provides a precise way of adjusting idle rpm by admitting more or less air to the mixture after it is discharged into the barrel. Filtered air enters this system through a pick-up hole near the base of the main venturi. The air passes the **idle air adjustment screw** down into the throttle body; then, is discharged below the throttle plate.

Opening the idle air adjustment screw leans the mixture and increases engine rpm. The **idle fuel adjustment screws**—one for each idle system—permit more fuel if needed for a smooth idle.

provides the fuel required by the engine at cruising speeds. Main metering systems are calibrated to deliver a lean mixture . . . about 15 parts air to one part gasoline . . . when the engine is *loafing along*. When more power is required, the main metering system continues to operate, and the mixture is made richer by other systems.

Parts of the Main Metering System

In the Model 4300 carburetor, the primary main metering system (Fig. 8) has two main metering jets; main wells, and main well tubes; calibrated air bleeds; discharge nozzles; and booster venturis. At rest, fuel flows from the bowl, through the main jets, and into the main wells and tubes. In each well and tube, the fuel assumes the same level as in the bowl until the engine begins to operate.

Pressure Difference Causes Flow

With the engine operating, the main metering system delivers fuel in response to the throttle plate opening. Opening the throttle causes air flow through the main venturi and booster venturi; the flow through the booster venturi causes a pressure drop or partial vacuum at the discharge nozzle. The fuel bowl is at air horn pressure, so we have a pressure difference that creates flow through the system. Fuel is sprayed out the discharge nozzle and mixes with the airstream.

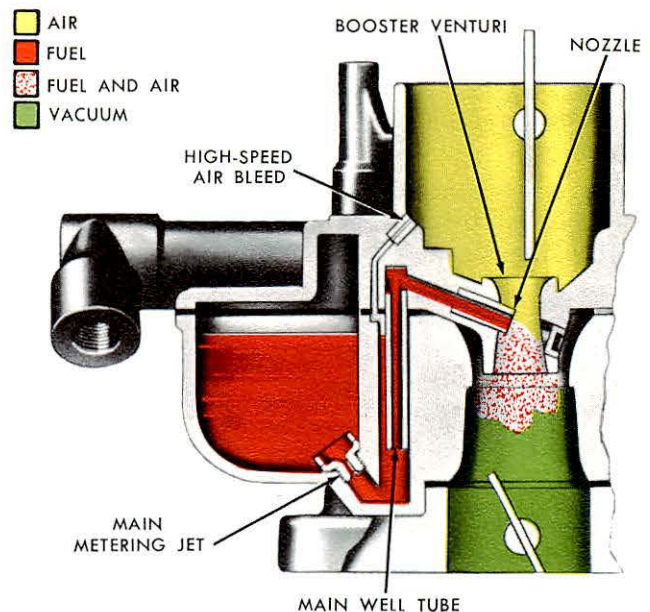


Fig. 8—Primary Main Metering System

The size of the main jet determines how much fuel is delivered for a given volume of air flow. Increasing or decreasing throttle opening increases or

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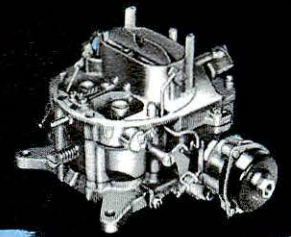
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decreases the fuel delivery so that the mixture proportion or ratio is quite constant.

Bleed Assists Vaporization

The high-speed air bleed (Fig. 9) in the system permits some air to be mixed with the fuel in the main well. The air enters the main well tube through two holes when fuel is flowing in the system. Adding air at this point assists vaporization, and compensates for the tendency of the air to become less dense at high speeds. The bleed also doubles as an anti-siphoning vent at low speeds. And it discourages percolation when a hot engine is shut down by venting the main well.

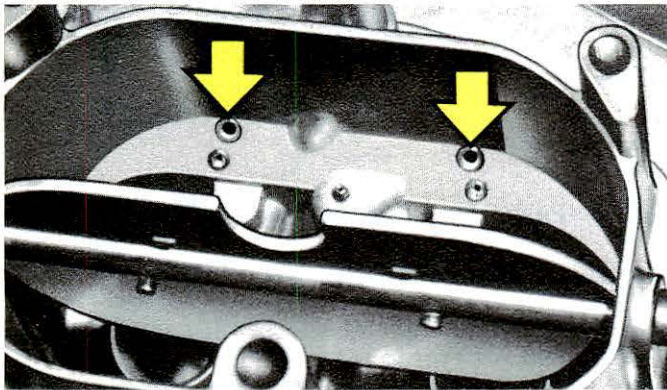


Fig. 9—High-Speed Air Bleeds

ACCELERATING PUMP SYSTEM

Air, being very light, responds rapidly to changes in the throttle opening. Gasoline is heavier, and therefore not as responsive. When the throttles are opened suddenly, air flow increases rapidly, but fuel flow lags. So that the engine will respond instantly to opening the throttle, we have an accelerating pump system, which furnishes a single spurt of fuel in each primary venturi when the throttles are opened.

Piston-Type Pump

A piston-type pump (Fig. 10) is actuated by a link from the accelerator linkage and by a spring to cause the pumping action. The pumping chamber is formed below a cup on the pump piston. A ball-type intake check valve and a needle-type discharge valve control the flow of fuel into and out of the pumping chamber and channels. Discharge nozzles open into primary venturis.

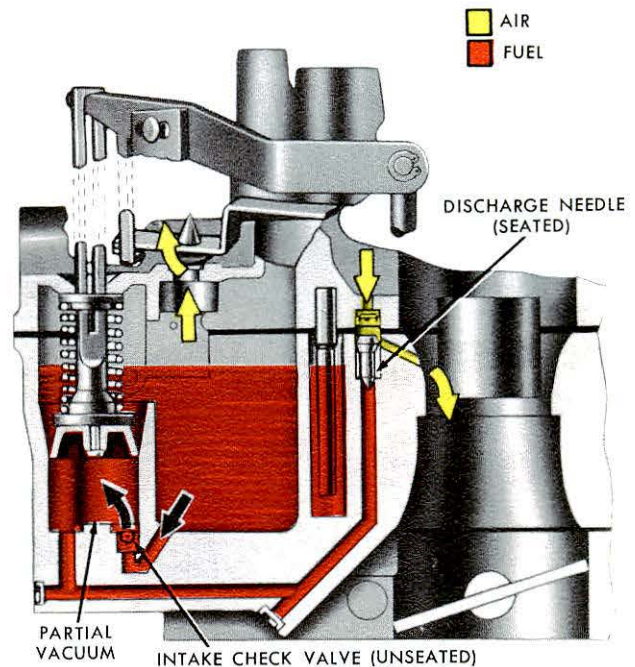


Fig. 10—Accelerating Pump System—Intake

or void is created below the piston cup in the pumping chamber.

Fuel in the bowl, at this time, is exposed to full atmospheric pressure, as the external vent valve lever also is actuated by the accelerating pump link to open the valve.

The pressure difference pushes the intake check valve off its seat and causes fuel to flow from the bowl into the pumping chamber. The discharge valve is seated, and prevents backflow in the discharge passages.

Fuel Discharge

When the throttles open (Fig. 11), the end of the accelerating pump link moves down in the piston arm slot, and the spring pushes the piston into the pumping chamber. Pressure builds up in the chamber to force the inlet valve closed on its seat.

Fuel is pumped through the discharge passages . . . the discharge valve is forced open by the fuel pressure . . . and fuel is sprayed out the discharge nozzle. When the piston has reached its limit of travel (depending on how far the accelerator is depressed), flow stops and the discharge valve seats. The discharge passages remain primed, or full of fuel, so that pumping action through the nozzles is instantaneous on the next cycle.

Air Bleed Check Valve

With the engine operating at high speed, a vacuum exists at the accelerating pump discharge

is are closed (Fig. 11). The piston is pushed up, and the partial vacuum

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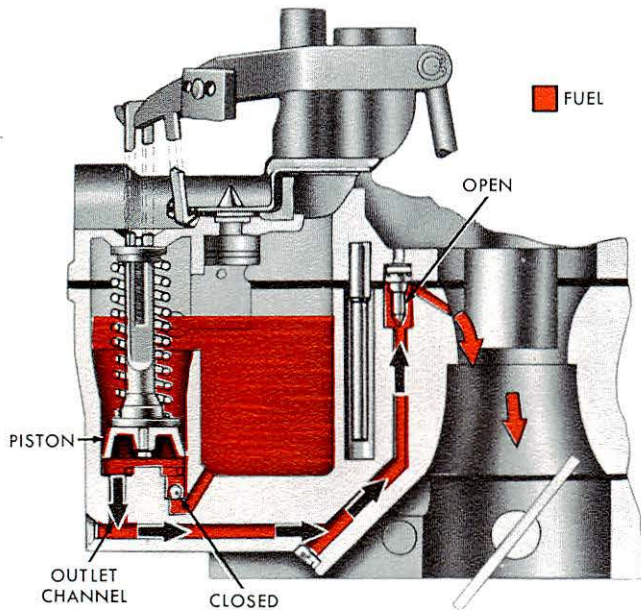
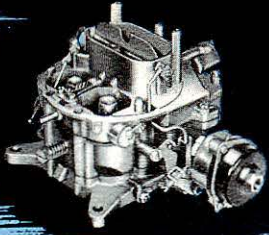


Fig. 11—Accelerating Pump – Discharge

nozzles. An air bleed check valve prevents this vacuum from siphoning fuel through the accelerating pump system when fuel is not being discharged. The valve is placed at the upper end of the discharge nozzle passage.

POWER FUEL SUPPLY SYSTEM

We have said that the main metering system provides a lean mixture for cruising conditions, when power requirements are not high. When more power is required . . . for high-speed operation or for accelerating . . . we have to burn more fuel. The small amount of fuel in a lean mixture doesn't provide enough heat upon combustion for full engine power. Therefore, we provide a way to "step up" or richen the mixture . . . we call this "step up" system the power fuel supply system (Fig. 12).

Vacuum Piston and Power Valve

The power fuel supply system uses a vacuum-controlled piston in the air horn body and a power valve to admit more fuel when power is required. The vacuum piston rod is spring-loaded and tends to push the rod down. The stem of the power valve also is spring-loaded, tending to hold the power valve up or closed.

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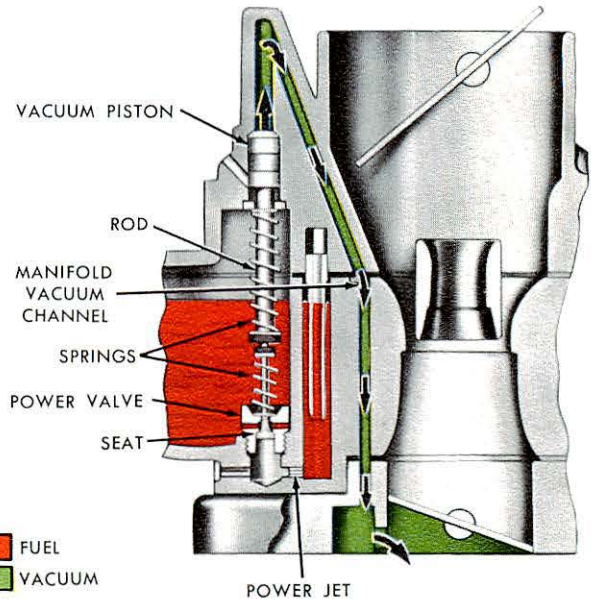


Fig. 12—Power Fuel Supply System

Another Passage to the Main Well

When the engine is under load, the vacuum drops. The vacuum piston rod is pushed down by its spring and the rod pushes on the power valve stem. The comparatively light power valve spring is overcome, and the valve opens (Fig. 13). Opening the valve gives us another passage from the bowl to the main wells . . . through the valve and power jets. The effect is the same as if we temporarily increased

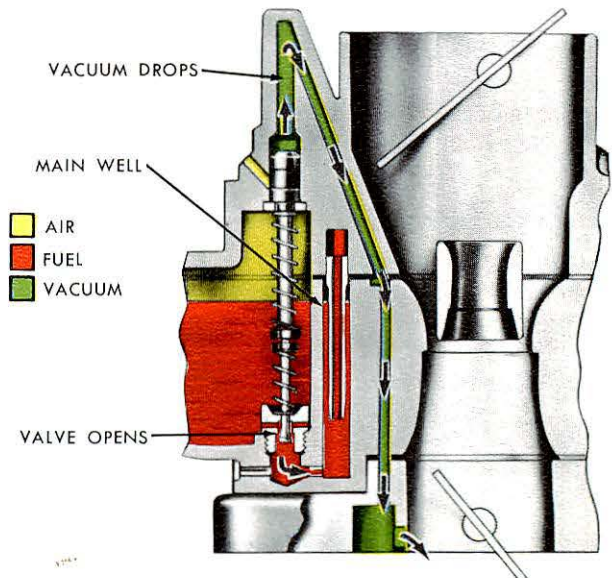


Fig. 13—Power Valve Action

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DESCRIPTION

The Ford 4300 model carburetor is a four-venturi type. It has three main assemblies; the air horn, the main body and the throttle body.

The main sub-assemblies contained in the air horn casting are: the accelerating pump piston, return spring and operating link; the fuel inlet needle, seat and float; the secondary air throttle plates and torsion spring; the choke plate; the hot idle compensator valve; the linkage and piston for the secondary air throttle damper, the primary and secondary booster venturis and the vacuum piston and spring for the power valve.

Under the air horn assembly is the main body. It contains the main metering jets, the power valve, the idle system air adjusting screw, the accelerating pump discharge needle, and fuel passages for the various systems.

Beneath the main body is the throttle body. Contained in the throttle body are the primary and secondary throttle plates and linkage, the idle fuel adjusting needles, and the automatic choke housing, bi-metal spring and pulldown piston.

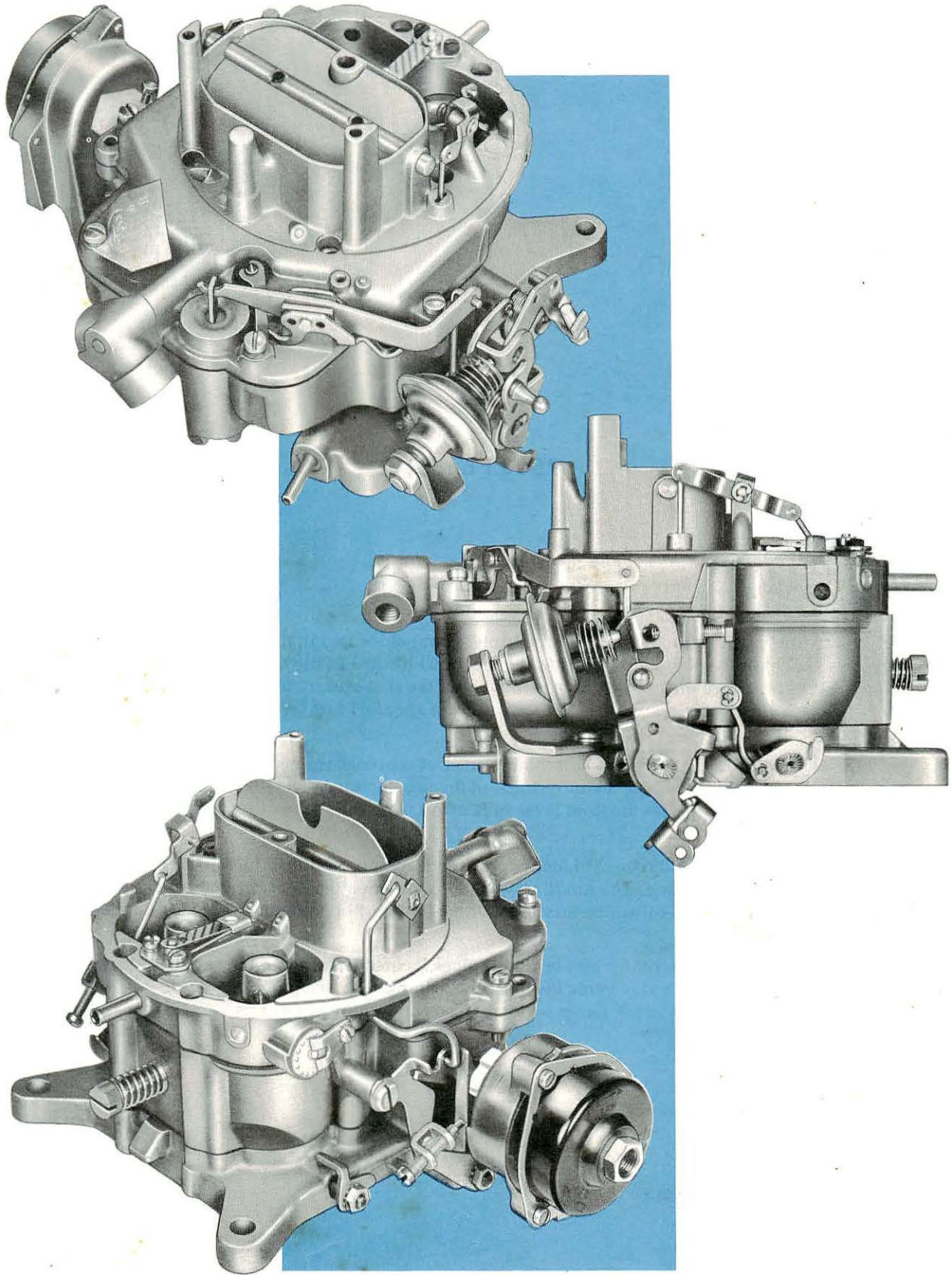
This carburetor design was adopted with the following objectives in mind:

- Adaptability to quality production.
- Acceptable hot fuel handling, hot restarts, and idle stability.
- Improved cornering performance.
- Reduced effect of dirty air cleaners on fuel economy.
- Compatibility with exhaust emission control systems.
- Improved choke operation.

The 4300 model carburetor will mount on the existing four-venturi intake manifolds with the throttle bores being on the same centers as previous Ford four-venturi carburetors.

Mounting height and air cleaner flange diameter has been maintained the same as on past models.





FORD 4300 CARBURETOR



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OPERATION

FUEL INLET SYSTEM

Fuel enters the carburetor through the fuel inlet channel located in the air horn. A needle valve and seat regulates the quantity of fuel flowing into the fuel bowl located in the main body. The quantity of fuel is regulated by the distance the needle valve is moved off the seat and by fuel pump delivery (volume and pressure). Correct fuel pump delivery is necessary if the specified fuel level within the carburetor is to be maintained.

The fuel level within the carburetor is maintained at a predetermined level by a dual pontoon float and lever assembly, which controls the movement of the needle valve. The float reacts to any lowering in the fuel level. The needle riding on the float lever falls away from the seat as the float drops to a lower fuel level.

To prevent fuel starvation during hot fuel vapor handling, an auxiliary fuel inlet valve opens to supplement the main fuel inlet valve. The auxiliary valve opens when the float drops below a predetermined level. The float lever presses against the auxiliary valve plunger, opening the valve for additional fuel to enter the fuel bowl.

The fuel bowl is vented internally by two stand pipes located adjacent to the choke air horn. In addition, a mechanically actuated valve vents the fuel bowl externally during periods of idle and part throttle operation, when fuel vapor is most likely to form. The accelerator pump link controls the movement of the external vent valve.

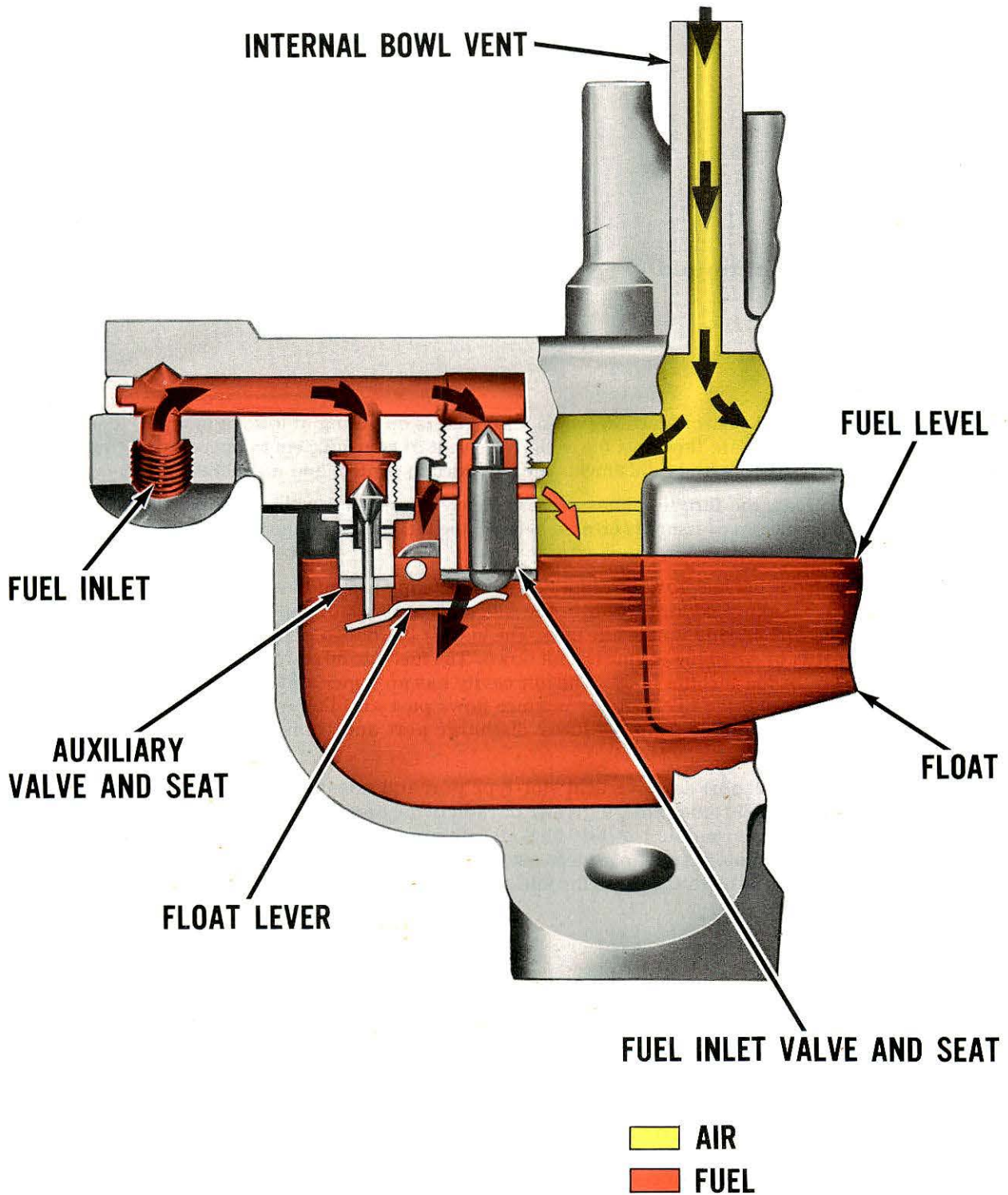


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OPERATION – Continued

IDLE SYSTEM

Idle Fuel

The primary idle fuel system functions when the engine is operating at low engine rpm. It supplies the fuel-air mixture when the air flow past the carburetor venturi is insufficient to operate the main metering system. Air bleeds, restrictors and adjustments are provided to control and meter the idle fuel-air mixture.

At curb idle speeds, the throttle plates are completely closed and with manifold vacuum below the plates, enough difference in pressure is created between the fuel bowl and the idle discharge ports to operate the idle fuel system.

Fuel is forced from the fuel bowl through the main metering jets and into the main well. The fuel then flows up through a calibrated restriction in the idle tube. Filtered air enters an idle air bleed restriction and mixes with the fuel flowing up the idle tube. The idle air bleed also serves as an anti-syphoning vent at high engine speeds or when the engine is shut down. The fuel-air mixture passes down the idle channel into an idle cavity in the throttle body. The idle cavity has an upper and lower discharge port. At curb idle (throttle plate closed), the idle fuel-air mixture flows past an idle fuel adjusting screw and is discharged below the throttle plate from the lower discharge port and from a small portion of the upper discharge port.

The upper discharge port is a vertical slot-type port and extends slightly below the closed throttle plate. When opening the throttle plate, a greater portion of the upper discharge port is exposed to manifold vacuum and a larger amount of idle fuel-air mixture will discharge from the upper port. Further opening of the throttle plate results in a decrease in manifold vacuum and a decrease in the quantity of idle fuel-air mixture that is discharged. As the idle system tapers off, the main fuel metering system begins to discharge fuel.

Idle Air Bypass

The idle speed (engine rpm) is adjusted by turning an idle air adjusting screw to admit more or less air, as required, below the throttle plates. This method of air control bypasses the throttle plates. Filtered air enters through a pickup hole located near the base of the main venturi. The air passes by the idle air adjusting screw and down into the throttle body. The air is then discharged from a port below the throttle plate.

It is particularly important that the idle air and the idle fuel mixture adjustments are performed at the same time. Opening the idle air screw to increase engine rpm leans the fuel-air mixture, consequently, the idle fuel mixture must also be increased to provide the proper fuel-air mixture for smooth engine idle.



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