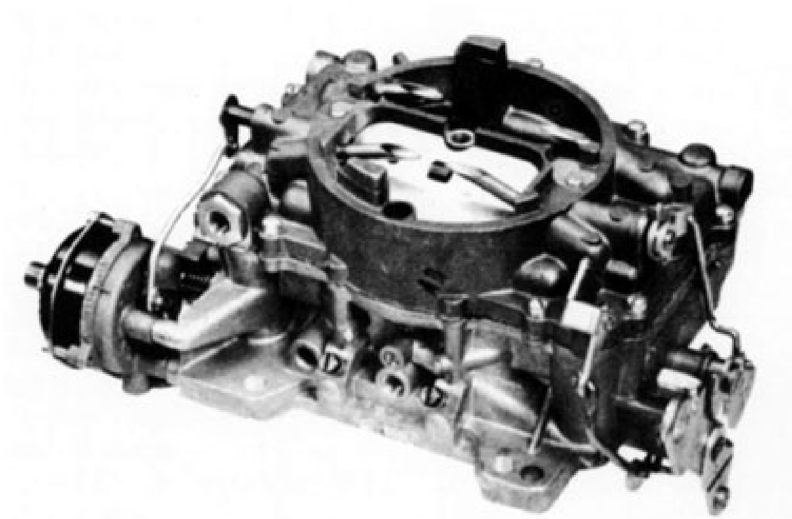
AFB-AVS
SERVICE MANUAL
CARTER CARBURETOR

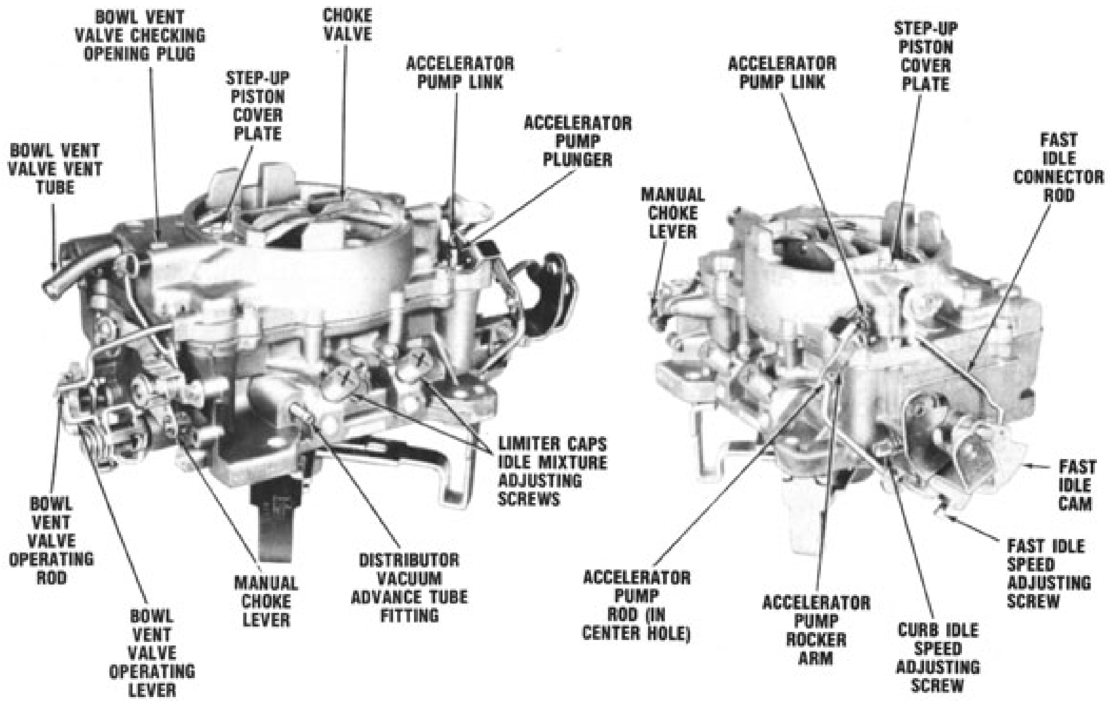


FEDERAL MOGUL

CARTER®

TABLE OF CONTENTS

MODELS AFB AND AVS



DESCRIPTION

The Carter models AFB "Aluminum Four Bore" and AVS "Air Valve-Secondary" are very unique in design, as the main body and flange are cast as a one piece unit. This, along with the bowl cover, make up the two piece construction which is made of light, durable aluminum to dissipate heat.

These carburetors are made in two basic configurations:

For air cleaners with 4¼" openings. These models are 3¾" high from base to air cleaner gasket surface.

For air cleaners with 5" openings. These models are only 3¼" high.

All units weigh approximately 7½ pounds.

Throttle bore spacing is for "square hole" intake manifolds.

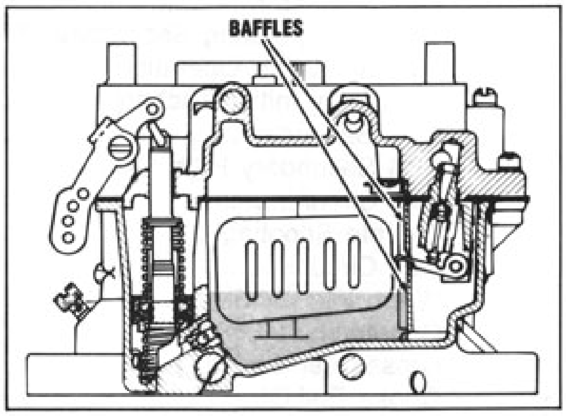
Primary and secondary high speed circuits incorporate the "air bled" design.

FIVE CONVENTIONAL CIRCUITS ARE USED. THEY ARE:

1. Two float circuits
2. Two low speed circuits
3. Two high speed circuits
4. One pump circuit
5. One choke circuit

The AVS circuitry is the same as the AFB except for the secondary side which has no venturis.

CIRCUITS



FLOAT CIRCUIT

The purpose of the float circuit is to maintain an adequate supply of fuel at the proper level in the bowl for use by the low speed, high speed, pump and choke circuits.

On some models, fuel enters the bowl through either a screen or a sintered bronze filter which is located in the bowl cover at the fuel inlet. The sintered bronze element is spring loaded to provide pressure relief. This relief spring allows fuel pump pressure to push the filter element off its seat if it becomes clogged. This will allow fuel to by-pass the element to get to the carburetor bowl. Be certain the filter element is installed with the flat side against the spring.

There are two separate float circuits. Each float circuit supplies fuel to a primary low speed circuit and a primary and secondary high speed circuit.

Baffles are used in the bowls to provide a stable fuel supply for the primary and secondary main jets.

The bowls are vented to the inside of the air horn and on certain models also to atmosphere. A connecting vent passage effects a balance of the air pressure between the two bowls. Bowl vents are calibrated to provide proper air pressure above the fuel at all times.

The intake needle seats are installed at an angle to provide the best possible seating action of the intake needles.

The needle is inclined 15° from the vertical position to provide better needle response to float movement.

Setting the brass floats to specifications assures an adequate supply of fuel in the bowls for all operating conditions.

TROUBLE SHOOTING THE FLOAT CIRCUIT

In servicing the carburetor, it is important to service the lip of the float which must be smooth for proper action and fuel level control. A small groove or indentation will probably be found on the lip from contacting the needle. Use a strip of emery cloth about ¼" wide and hold the abrasive side to the float lip. Place thumb on the cloth where it passes over the lip, and while pressing with the thumb, pull the emery cloth through until a new contact surface on the float lip is attained.

Examine the float for dents, a dented float will sink deeper into the fuel (less buoyant) which will raise the fuel level. Replace all dented floats. Check the float to determine if it is "loaded with gas." Sometimes shaking the float, or dropping it gently on the work bench, allows one to hear the fuel splash inside. The sound will immediately indicate whether or not the float is "loaded with gas." These must be replaced.

Float adjustment for proper fuel level in the bowl is important. Low or high settings affect the transfer point (transfer from low speed circuit to the high speed circuit as the throttle is opened).

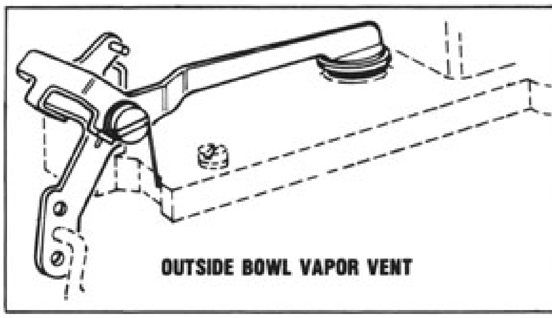
A high float setting can result in flooding, while a low float setting could cause a hesitation in a turn, should the jet become uncovered.

Proper float drop adjustment is necessary. Too much float drop allows the inlet needle to drop too far from the needle seat which may cause the needle to bind, preventing float return to proper level. This results in flooding as the float cannot seat the needle.

Special consideration should be given in service to be sure the floats do not bind in their hinge pin brackets or drag against inner wall of the bowl.

Use of a new bowl cover gasket and proper tightening of the bowl cover screws is a must. A leak at the bowl cover would cause an increase in pressure in the bowl, resulting in a rich mixture.

The carburetor bowl and the intake strainer screen should be clean and free of dirt, gum or other foreign matter. To assure a positive seal, the gasket surface of the castings must be free of nicks and burrs. An air or fuel leak at these points can result in a mileage complaint and cutting out on sharp turns or sudden stops. A new air horn gasket should be used when reassembling.



OUTSIDE BOWL VAPOR VENT

VENTING THE FUEL BOWL

Venting of the fuel bowl is an important part of the carburetor. Air must enter or leave the bowl every time the level of fuel changes in the bowl.

During acceleration the liquid fuel level in the bowl is lowered. This allows the float to drop allowing the needle to come off its seat so that gasoline can enter the bowl. The increased space (above the liquid) caused by the lowering of the fuel level must be filled with air in order to maintain a constant pressure in the bowl. This is the purpose of the bowl vent. During constant throttle operation, the amount of fuel entering the bowl is the same as the amount being discharged from the low speed or high speed circuit.

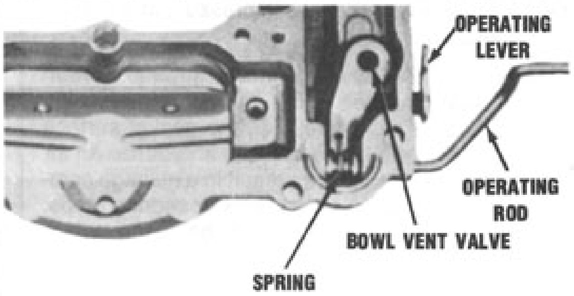
The AFB and AVS carburetors use combination inside-outside vents. As pressure is higher at the outside vent, air movements from the outside vent to the inside vent is used to keep all fuel vapors swept from the fuel bowl.

Later models use a mechanically operated bowl vent that opens at closed throttle position.

When the engine is turned off, underhood temperatures increase causing vapors to rise from the fuel in the bowl. The outside vent improves starting characteristics as it prevents vapors from entering the bore of the carburetor by way of the inside vent.

A dirty air cleaner would cause a rich mixture or a loss of volumetric efficiency depending on the type of carburetor vents used.

All off-idle engine operation is with the inside vent only. With this type vent, the pressure in the fuel bowl and in the carburetor air horn are the same. In other words, a balance is effected between the pressure in the air horn and the pressure in the bowl. This prevents a rich condition should the air cleaner become restricted. A restricted air cleaner with this type of venting will not change the air-fuel ratio. However, it will affect volumetric efficiency.

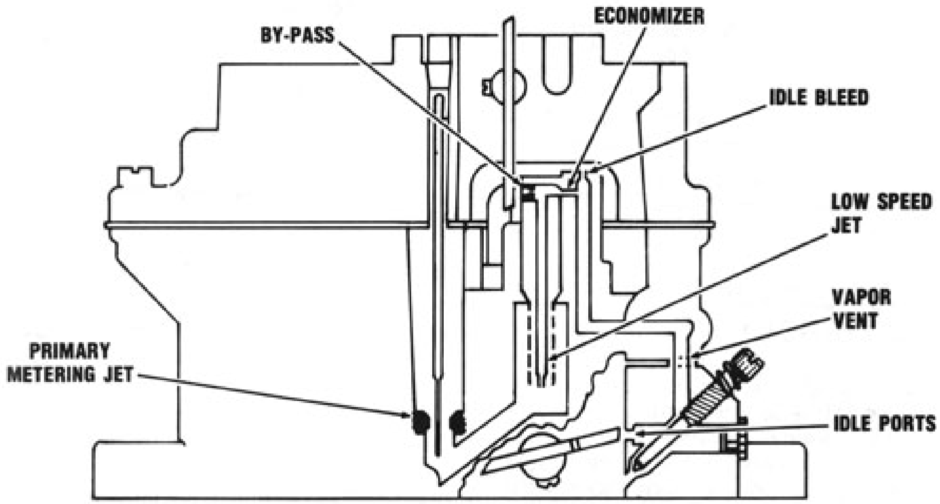


VENT TO CANISTER

Emission Laws effective in 1971 required all outside vents to be routed to a canister to prevent evaporative emissions.

Bowl vapor vent adjustment must be to specifications. If valve doesn't open to specifications with throttle valves closed, bowl vapors cannot escape freely and this may cause "hard hot-starting." If it opens too far, or hangs open, it will allow an external vent to the bowl, resulting in poor mileage.

LOW SPEED CIRCUIT



LOW SPEED CIRCUIT

Fuel for idle and early part throttle operation is metered through the low speed circuit. The low speed circuit is located on the primary side only.

Gasoline enters the idle wells through the main metering jets. The low speed jets measure the amount of fuel for idle and early part throttle operation.

Following this circuit downstream, the first entrance of air is called the "By-Pass." This is followed by the "Economizer." The air and fuel mixture is "squeezed" through this restriction and ejected into the lower pressure area which speeds up the flow and further mixes the air and gasoline. Following downstream is the second entrance of air, called the "Idle Bleed" and then to the "Idle Port." This is known as a Five Point Circuit: Low Speed Jet, By-Pass, Economizer, Idle Bleed and Idle Port.

The idle jet, by-pass, economizer and idle bleed are located in the primary venturi cluster.

A few early models used fixed idle circuits on the secondary side. No idle adjusting screws are used, adjustment is on the primary side only.

Equally important, tiny air bubbles enter the fuel stream through the air bleeds. Aerating the fuel before it reaches the idle port helps the fuel mix more readily and uniformly with the air flowing through the carburetor.

The quality of the mixture is determined by the size of the idle jet, the by-pass and the idle bleed. The quantity of the mixture to the idle port is adjusted by the idle adjusting screws.

The idle ports, located directly above the idle adjusting screws ports, are slot shaped. As the throttle valves are opened, more of the idle ports are uncovered, allowing a greater quantity of the air-fuel mixture to enter the carburetor bores.

Although the idle port is located below the fuel level in the bowl, no siphoning action takes place because the by-pass and the idle bleed serve as vents to prevent siphoning of fuel from the bowl.

Further opening the throttle causes the throttle valve to move away from the idle port. This increases the pressure at the port, diminishing fuel delivery from the low speed circuit. The increase in air velocity with throttle opening causes fuel flow from the high speed nozzle. This is known as the transfer point.

A low float setting can cause a problem at the transfer point as the high speed nozzle will not begin fuel delivery at the correct time. Float setting plays its part in timing the nozzle.

An idle adjusting screw is used for trimming the idle mixture to individual engine requirements.

Turning the idle adjustment screw toward its seat reduces the quantity of air-fuel mixture supplied by the idle circuit. This is an over-rich mixture that emerges from the port, but is leaned to a proper combustible mixture by the air that enters the engine manifold around the "cracked" primary throttle valve. Consequently, rotating the idle adjusting screw inward leans the idle mixture and rotating it outward enriches the idle mixture.

Dirt or foreign material in the economizer will cause a lean idle condition, any restriction in the by-pass or idle bleed will result in a rich condition.

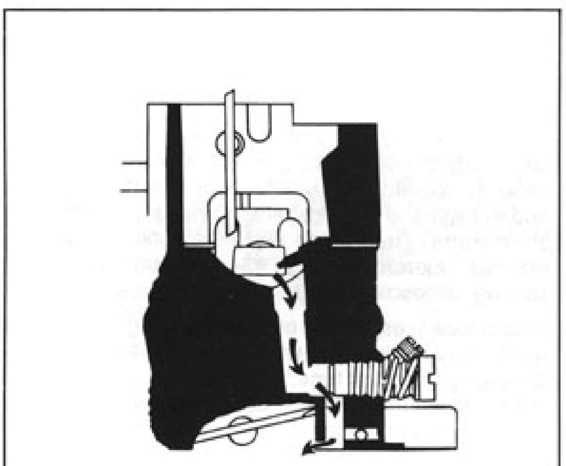
To assist in quick hot engine starting on some pre-emission models, fuel vapor accumulated in the primary and secondary bores is vented to atmosphere through vent passages in the carburetor bores, above the throttle valves.

The low speed jet, idle bleed, economizer and by-pass bushings are pressed in place. Do not remove in servicing. To insure proper alignment of the low speed mixture passage, the primary venturi assemblies were designed with interlocking bosses so they can only be installed in the proper locations.

(When the primary venturi assemblies are placed in the wrong side of the carburetor, they will not fit all the way into the casting.)

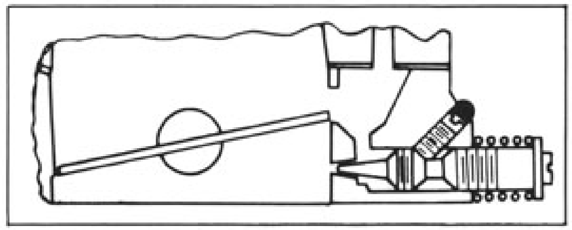
The by-pass, economizer, idle bleed, idle port, idle adjustment screw port, as well as the bore of the carburetor flange must be clean and free of carbon. Obstructions will cause poor low speed engine operation.

Air leakage at the gasketed surface surrounding the low speed (idle) mixture passages or between the flange and manifold may cause poor idle and low speed operation. Always use new gaskets when servicing the carburetor.



BY-PASS IDLE CIRCUIT

Many units use a by-pass idle circuit to overcome rapid gumming and icing conditions at the throttle valves. With the by-pass idle circuit, the car idles with the throttle valves completely closed. RPM is adjusted by the large brass adjusting screw located between the idle mixture screws. The throttle valves used with the by-pass idle circuit have 1/8" holes which supply additional air. They also cause a swirling effect which prevents gum and carbon formations.

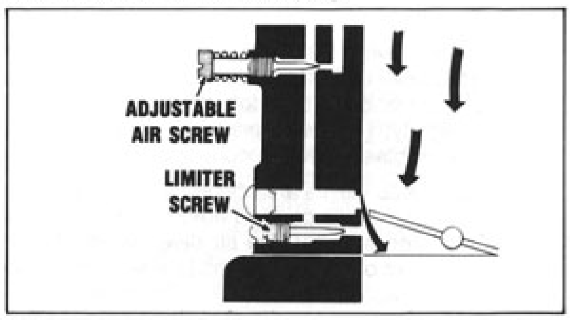


IDLE ADJUSTING SCREW

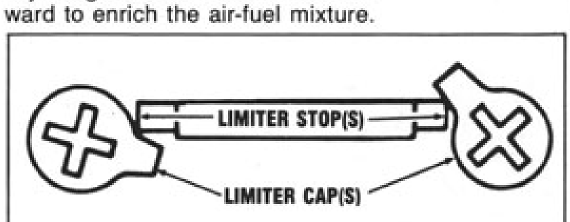
Since 1966, emission laws require some means for limiting the adjustability of the idle mixture screws. This allows for proper idle adjustment while assuring the emission limits will not be exceeded.

The above design provides a means to prevent over-rich mixtures. An allen screw is used as a stop as it makes contact with the shoulder on the recessed portion of the idle adjusting screw.

On flow test, the idle adjusting screws are turned in the counterclockwise direction to the mean rich limit. The allen screws are then turned in against the recessed shoulder of the idle adjusting screws. The allen screw holes are filled with a lead plug.

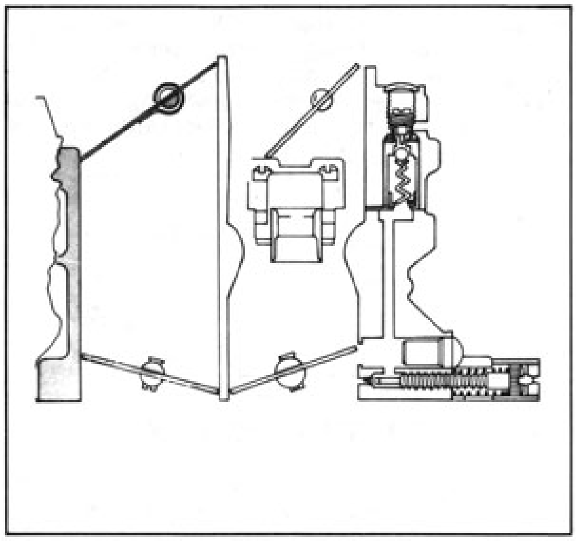


Another version uses idle adjusting screws which are completely recessed in the flange of the carburetor. After final adjustment they are sealed with a lead plug. The upper adjusting screw is an air adjustment screw and adjusts the mixtures for both bores. This air adjustment screw has left-handed threads. Turning the adjusting screw counter-clockwise moves the screw inward to enrich the air-fuel mixture.



IDLE LIMITER CAPS

Many late model carburetors use idle limiter caps to prevent over-rich idle adjustment.



ADJUSTABLE OFF-IDLE AIR BLEED

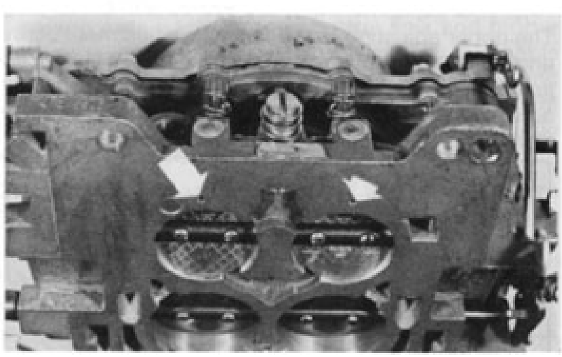
Some older AVS models use an "adjustable off-idle air bleed" which is adjusted during flow test. This adjustment should never be changed as it cannot be adjusted in the field.

The purpose of the "adjustable off-idle air bleed" is greater control of the air-fuel ratio at flow rates above curb idle, resulting in substantial reduction in hydrocarbon emissions.

The air bleed valve is set to open at an idle port vacuum of 7 to 12 inches of water, which is slightly above the three to four inches at curb idle. When the throttle is opened slightly, the lower pressure at the idle port opens the air bleed valve to control the air-fuel ratio.

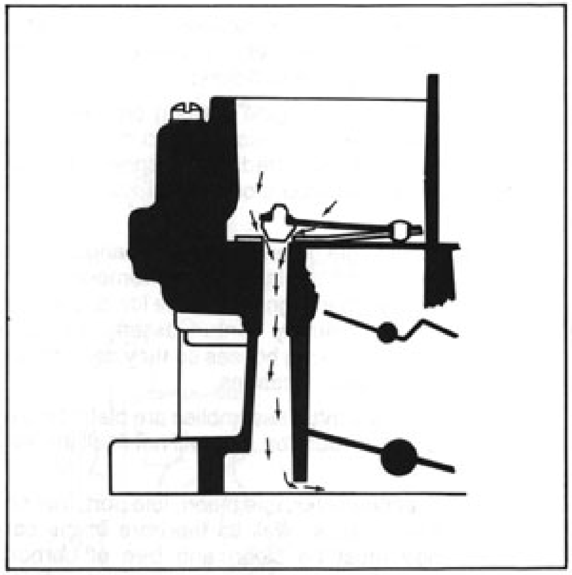
When the throttle valves are opened a certain amount, the vacuum at the idle port will drop below the 7 to 12 inches of water, allowing the air bleed valve to seat. This enrichment of the air-fuel mixture is desirable for a high rate of acceleration.

The air bleed valve will open on deceleration from high speed to prevent rich mixtures.



IDLE SPOIL PORTS

Some installations use a flange baffle plate which is installed between the carburetor and the carburetor mounting gasket. Cadillac carburetors use "idle spoil" ports which consists of an 1/8" hole from the flange face into each low speed circuit. These "spoil ports" are sealed by the flange baffle plate. If the baffle plate is left out or misinstalled, exhaust gases enter the low speed circuits and the engine will not idle.



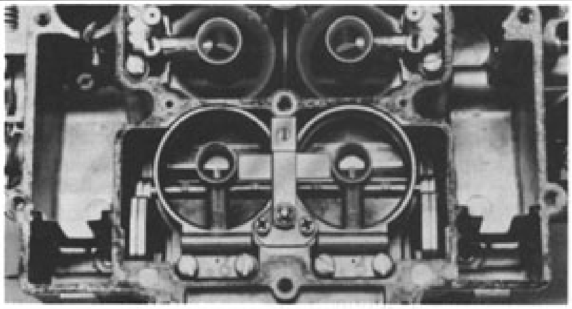
HOT IDLE VENT PASSAGE

During long periods of idling with an extremely hot engine, the fuel in the carburetor bowl becomes hot enough to form vapors. These vapors enter the carburetor bores by way of the inside bowl vents. The vapors mix with the idle air and are drawn into the engine causing an excessively rich mixture and a loss in RPM or engine stalling. Also, the decrease in the density of the air caused by extremely high under-hood temperatures reduces the idle speed.

The hot idle air valve is calibrated to open under these temperature conditions, permitting additional air to enter the manifold below the secondary throttle valves and mix with the fuel vapors providing a more combustible mixture. The engine RPM may still vary slightly, however, extremely rough idle operation and engine stalling are avoided.

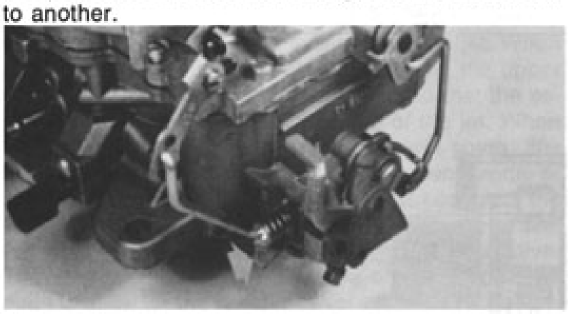
This device is especially beneficial during traffic operation in very hot weather when the car is allowed to idle for a long period of time, particularly on air conditioning equipped automobiles. One of the other more common driving conditions that will bring the thermostatic valve into operation is when the car has been driven at highway speeds during a very hot day and then a line of traffic causes a delay where the engine must be run at idle speed, moving the car only a few feet at a time.

The valve is calibrated to open when the air in the bore of the carburetor reaches a predetermined temperature with 15" of vacuum at the seat of the valve. In service, if any doubt exists concerning the operation of the valve, it should be replaced.



HOT IDLE VENT WITH WING

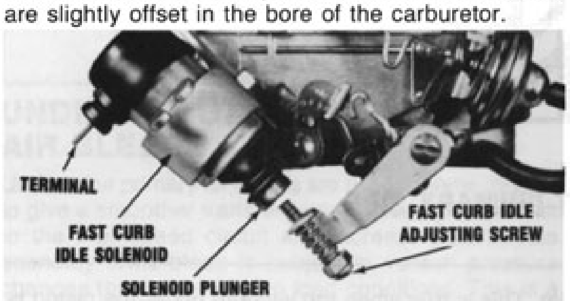
"Wings," which actually serve as baffles to aid distribution of fuel, are used on several applications. Due to the "wings" and the opening temperature, hot idle compensators are not interchangeable from one unit to another.



GROUNDING SWITCH

Some AVS models incorporate a grounding switch to control the distributor solenoid. When the throttle valves are at idle position, the grounding switch grounds the distributor solenoid which retards ignition timing.

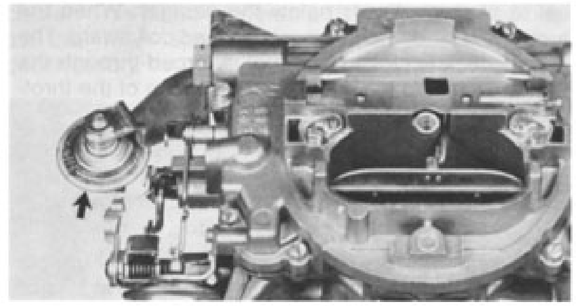
To assist throttle closure, the throttle shaft and valves are slightly offset in the bore of the carburetor.



IDLE SOLENOID

Many carburetor models use an idle solenoid to prevent "dieseling" or "after-run".

When the ignition is turned on, the solenoid is energized moving the plunger outward. The idle RPM is adjusted at the solenoid. When the solenoid is de-energized, the plunger moves inward, allowing the throttle valves to close enough to virtually shut off the air supply, causing the engine to stop running immediately. Some units have a second adjustment to prevent the throttle valves from closing too tight, causing them to stick in the throttle bores.

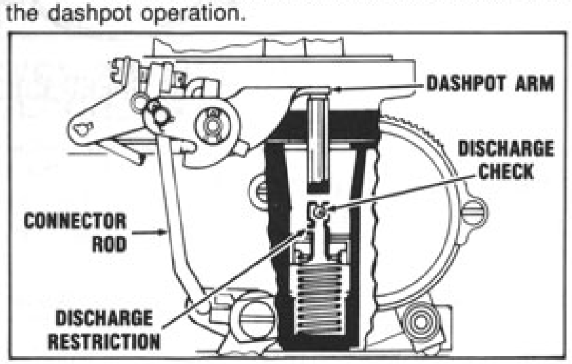


DASHPOT

Some applications use a slow closing throttle device commonly called a dashpot. They are used to delay or slow the throttle closing the last few degrees to prevent engine stalling at the lower speeds and also to eliminate a sudden peak of hydrocarbon emissions on sudden deceleration.

At idle, manifold pressure is very low resulting in good vaporization of the air-fuel mixture. Manifold pressure increases with throttle valve opening. This increase in manifold pressure increases the boiling point of the liquid which results in something less than 100% vaporization of the air-fuel mixture. During these periods of high manifold pressures, some wet particles of fuel cling to the inside of the intake manifold which is known as "wet manifold." When the throttle valves are suddenly closed, the manifold pressure goes back to a low pressure state. These wet particles inside the intake manifold go back to a vaporous state and are taken into the engine as a rich mixture. This is known as manifold flash. Deceleration from higher speeds gives the engine time to clear itself of these rich mixtures, however, during deceleration at the lower speeds, the engine doesn't have time to clear itself of these rich mixtures and may stall. The dashpot retards throttle closing the last few degrees, giving the engine time to clear itself of these rich mixtures. It also eliminates a sudden peak of hydrocarbon emissions on sudden decelerations.

Extra throttle return spring or maladjustment can upset the dashpot operation.



HYDRAULIC DASHPOT

An internal dashpot is incorporated on some models to slow the closing of the throttle and to prevent stalling on quick deceleration.

When the throttle is opened, the plunger spring pushes the plunger upward. The intake check opens allowing fuel to fill the cylinder below the plunger. When the throttle is closed, the plunger is pushed downward. The intake check is closed and fuel is forced through the discharge restriction delaying the closing of the throttle valves.

Be sure the plunger leather is in good condition and the intake check and discharge restriction are free of lint, gum or other foreign matter. The plunger shaft must operate freely in its guide in the air horn.

It may be necessary to adjust the dashpot on the car due to engine/transmission combinations and individual driving habits. Be sure the dashpot arm does not contact the air horn next to the plunger shaft at idle. This condition may cause inconsistent idle speeds.

TROUBLE SHOOTING THE LOW SPEED CIRCUIT

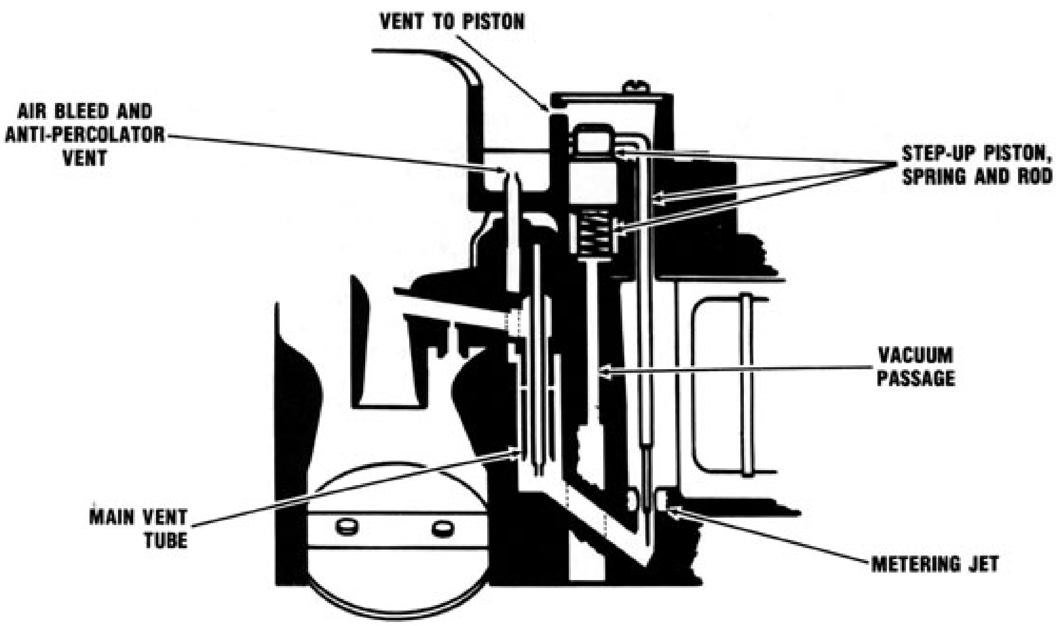
Port relation is the position of the throttle valve relative to the idle port at curb idle. Port relation could be out of specifications due to carbon in the bore of the carburetor, throttle shaft or throttle body wear. In either case, it can upset the idle and affect the transfer point.

Improper idle adjustment can also upset port relation.

The idle adjusting screws can be used to quickly test the low speed circuit on the car. The idle adjusting screws should be sensitive when turning "in" or "out."If turning the mixture screws does not appreciably affect idle, there could be a problem in the low speed circuit.

If the best idle is attained with the idle mixture screws seated or near the seat, it is indicative of a rich idle mixture. This could be traced to dirt in the by-pass or idle bleed, or both of them partially plugged.

If the best idle is attained with the idle mixture screws near the outward (counterclockwise) position, it is indicative of a lean idle mixture. This could be dirt or a restriction in the economizer.



HIGH SPEED CIRCUIT-PRIMARY SIDE

HIGH SPEED CIRCUIT-PRIMARY SIDE

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

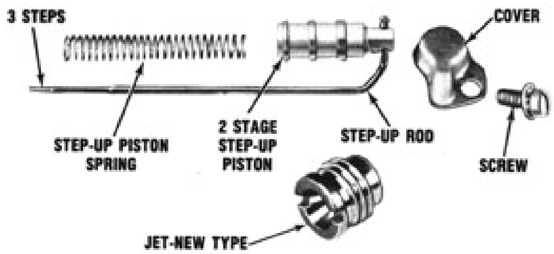
The position of the step-up rod in the main metering jet controls the amount of fuel admitted to the nozzles. The position of the step-up rod is controlled by manifold vacuum applied to the vacuum piston.

During part throttle operation, manifold vacuum pulls the step-up piston and rod assembly down, holding the large diameter of the step-up rod in the main metering jet. This is true when the vacuum under the piston is strong enough to overcome the tension of the step-up piston spring. Fuel is then metered around the large diameter of the step-up rod in the jet.

Under any operating condition, when the tension of the spring overcomes the pull of vacuum under the piston, the step-up rod will move up so its smaller diameter, or power step, is in the jet. This allows additional fuel to be metered through the jet. The step-up rod does not require adjustment.

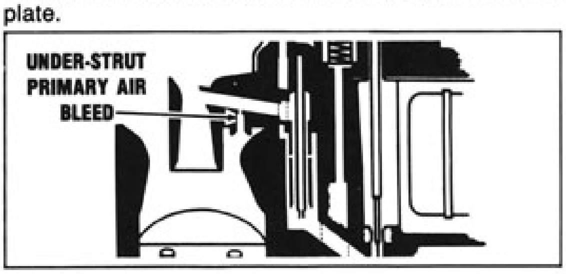
A vent tube aerates the fuel as it leaves the high speed well.

Both downhill and uphill nozzles have been used.



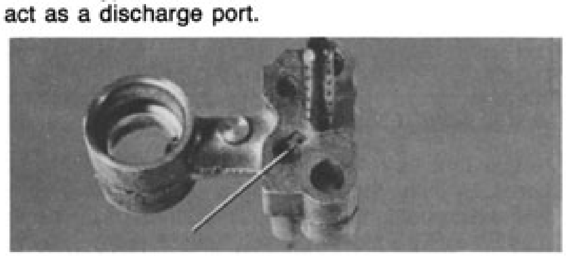
STAGED STEP-UP RODS

The AVS and some AFB carburetors use staged step-up rods to better control fuel and air mixtures throughout the entire high speed range. When the manifold vacuum is high (above 12" Hg), both springs are compressed allowing the step-up piston to bottom and the top step of the rod to remain in the jet. When the manifold vacuum drops to 10"-12" Hg, the upper spring lifts the step-up piston and rod so that the second step of the rod is in the orifice of the jet. When the vacuum drops to 4"-6" Hg, the lower spring lifts the step-up piston and rod to the wide open throttle or power step of the rod. The metering jets used with the staged step-up are 1/8" higher to allow greater travel of the step-up rod to make the staging less sensitive. The step-up piston uses a raised or extruded cover plate to allow for the greater travel of the metering rod. All other AFB carburetors use a flat step-up piston cover plate.



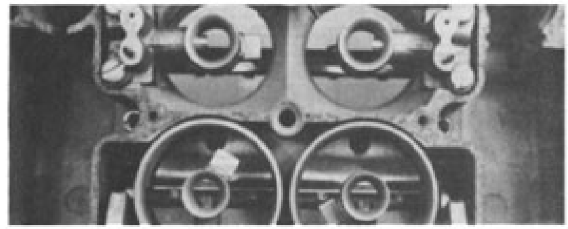
UNDER-STRUT PRIMARY AIR BLEEDS

Under-strut primary air bleeds are used in some models to give a smoother transfer from the low-speed circuit to the high-speed circuit and increase part throttle economy. This bleed is subject to venturi pressure changes that follow engine load conditions. This is a variable type bleed and under some conditions, could act as a discharge port.



CROTCH BLEED

Some models use a crotch bleed located in the venturi cluster. This bleed prevents a rich condition and bog as the high speed circuit is reinitiated, after deceleration.



DISTRIBUTION TABS

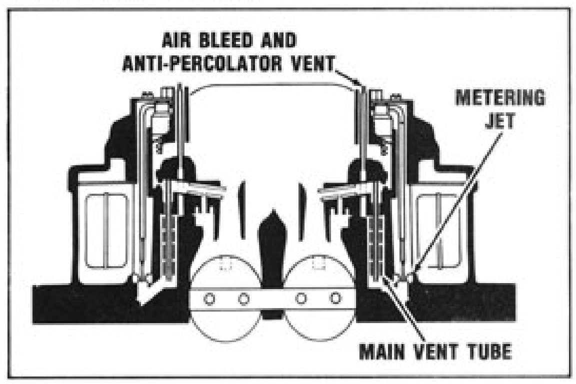
Some models have small "L" shaped metal tabs attached to one or both primary venturi clusters. These protrude into the air stream at the proper location to aid distribution of fuel.

TROUBLE SHOOTING THE HIGH SPEED CIRCUIT

Use of the wrong step-up piston spring, or one that has been stretched or cut off can seriously upset carburetor calibration.

A clogged air bleed or main vent tube may cause excessively rich mixtures. The high speed bleed and main vent tubes are permanently installed.

An incorrect float setting can also adversely affect high speed circuit operation.



HIGH SPEED CIRCUIT SECONDARY SIDE

Fuel for the high speed circuit of the secondary side is metered at the main metering jets. No step-up rods are used.

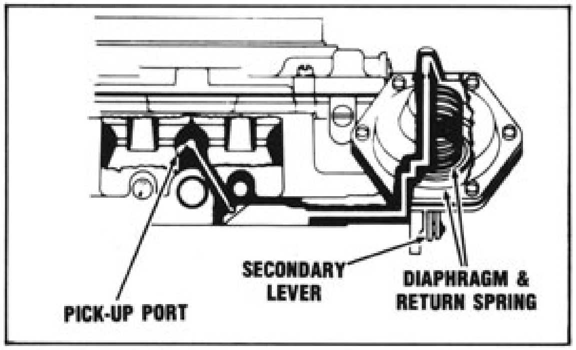
On some applications the secondary metering jets are located under the secondary venturi cluster.

Due to the use of step-up rods on the primary side, the primary main metering jets are larger than the secondary jets.

ANTI-PERCOLATOR

The high speed bleeds also act as anti-percolator vents when a hot engine is stopped or at idling speed. They vent fuel vapor pressure in the high speed wells before it is sufficient to push fuel out of the nozzles and into the intake manifold.

SECONDARY THROTTLE VALVE OPENING DEVICES

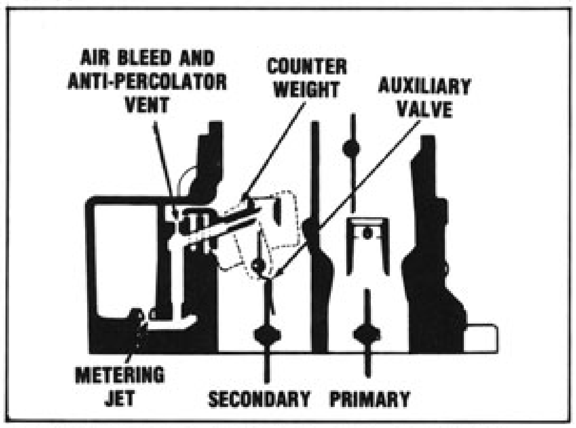


VACUUM OPERATED SECONDARY VALVES

The secondary throttle valves, on some models, are vacuum controlled. This feature provides the added capacity of the secondaries only when the engine is able to make use of this capacity.

When the accelerator is fully depressed, the secondary valves are cracked open manually a few degrees. Air passing through the primary venturis determines the amount of vacuum applied to the secondary throttle operating diaphragm, by way of the primary vacuum pick-up port. When the vacuum is strong enough to overcome the diaphragm spring, the secondary valves open. A vacuum pick-up port, located in the secondary venturi, supplies vacuum to overcome the partial loss of vacuum at the primary pick-up port, when the secondary valves open.

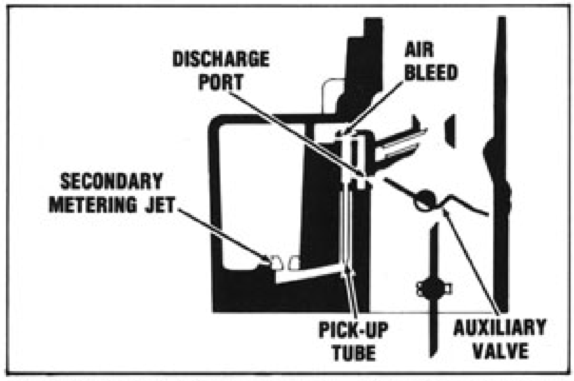
A mechanical over-riding linkage insures that the secondary valves will always close with the primary valves.



AUXILIARY VALVE OPERATION

Some models use offset valves above the secondary throttle valves. These are called "auxiliary throttle valves." Counterweights are located on the ends of the auxiliary throttle shaft. The auxiliary valve counterweights operate in a recess inside the carburetor body. Throttle valves in the secondary side remain closed until the primary valves have been opened a predetermined amount. Air velocity through the carburetor controls the position of the auxiliary valves. The auxiliary valves open when the force of the air against the offset valves is able to lift the counterweights.

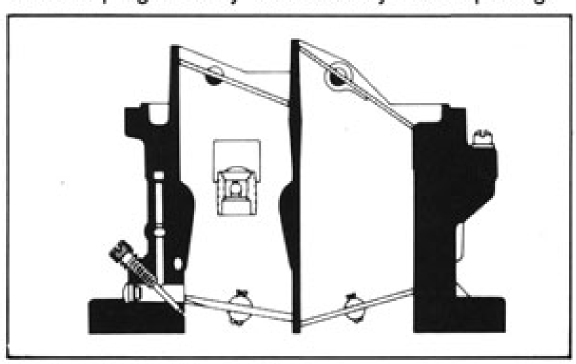
When the accelerator is fully depressed, only the primary high-speed circuit will function until there is sufficient air velocity to open the auxiliary valves. When this occurs, fuel will also be supplied through the secondary high-speed circuit.



SECONDARY INITIAL DISCHARGE

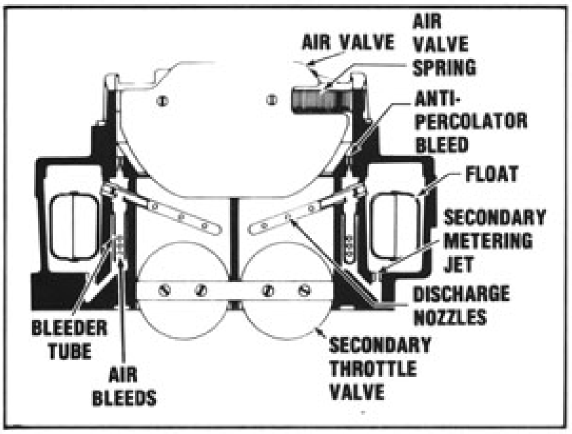
On models with auxiliary valves, initial discharge ports are incorporated to assist the starting of the fuel flow in the secondary high-speed circuit. These ports are located next to the venturi struts. When the auxiliary valves start to open, the vacuum at the discharge ports pulls fuel into the pick-up tubes. Air bleeds serve to break-up the liquid fuel and mix it with air as it moves through the passages to the initial discharge ports where it is discharged into the air stream. As the auxiliary valves continue to open, and the secondary nozzles deliver additional fuel, less fuel flows from the initial discharge ports.

Some units incorporate two initial discharge ports that come in progressively with auxiliary valve opening.



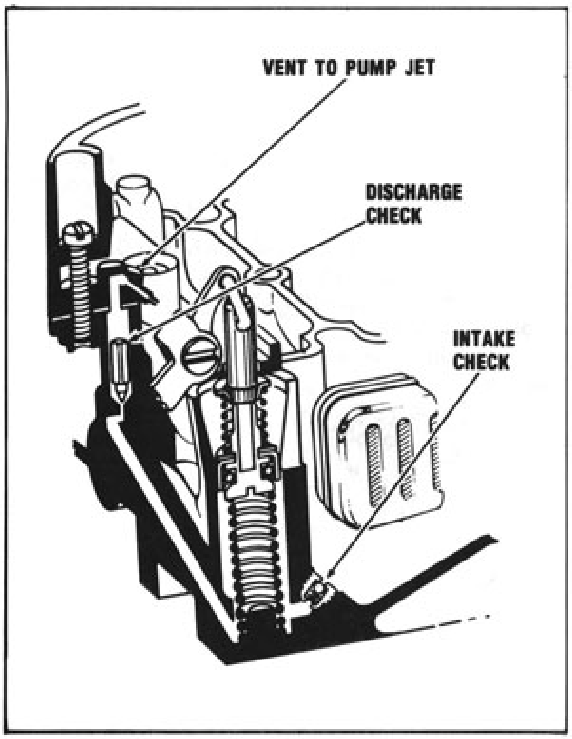
AVS SECONDARY

Notice that there are no venturis in the secondary bores. By using the air valve principle, fuel is metered in direct proportion to the air passing through the secondary bores. This provides a very smooth response when the secondary valves start to open, permitting earlier secondary nozzle delivery and also increased air capacity.



AVS SECONDARY HIGH SPEED CIRCUITS

There are no step-up rods used in the secondary main metering jets. The air valve is mounted off-center on its shaft so that the incoming air tries to push it open. A closely calibrated spring is mounted on the end of the shaft. Since it tends to hold the valve closed, the force of the incoming air against the valve, opposing the closing torque of the spring, correctly positions the valve in the air stream.



PUMP CIRCUIT

The accelerating pump circuit, located in the primary side, provides a measured amount of fuel necessary to insure smooth engine operation on acceleration at lower car speeds.

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

At higher car speeds, pump discharge is no longer necessary to insure smooth acceleration. When the throttle valves are opened a predetermined amount, the pump plunger bottoms in the cylinder eliminating pump discharge.

During high speed operation, a vacuum exists at the pump discharge ports. To prevent fuel from being drawn through the pump circuit, the pump jets are vented on some models by a cavity between the pump jet restrictions and discharge ports. This allows air instead of fuel to be drawn through the pump discharge ports. A brass discharge check needle is used. The weight of the needle also prevents pump pull-over.

Many models use a vented pump plunger to provide relief for any vapors which may form during hot idle or when a hot engine is stopped.

TROUBLE SHOOTING THE PUMP CIRCUIT

Trouble shooting the pump circuit should include a thorough check of the intake and discharge checks, pump plunger, duration spring and all linkage.

If the discharge check is not seating, air will be drawn into the pump circuit during deceleration. On acceleration, air would be discharged before solid fuel is delivered to the pump jet resulting in a stumble or hesitation.

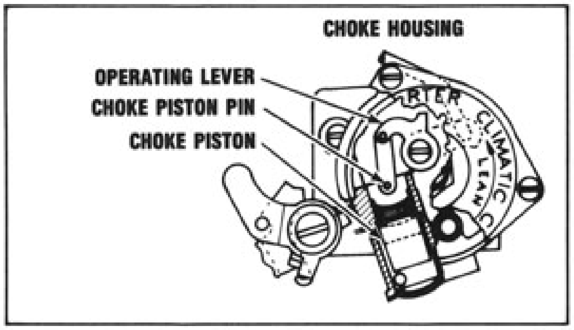
If the intake check is not seating, some of the fuel during acceleration will be returned to the fuel bowl, resulting in lack of fuel for acceleration.

To determine if the checks are seating, proceed as follows: With fuel in the bowl and pump passages, use a suitable tool to hold the discharge check on its seat. While holding the discharge check against its seat, manually raise and lower the pump plunger in its cylinder several times. This will create a pressure in the circuit. If fuel leaks into the fuel bowl (noted by bubbles), the intake is leaking.

To test the discharge check, make certain fuel is in the entire circuit. With the discharge check on its seat (by its own weight), squirt gasoline on top of the check and observe. If the fuel does not leak past the check (remains on top) for a period of 30 seconds, then the check is good.

Check condition of pump plunger and pump cylinder.

The linkage connecting the pump plunger to the throttle requires an adjustment to obtain the correct pump stroke for proper pump delivery. This adjustment must be made according to specifications listed by the manufacturer.



CHOKE CIRCUIT

The automatic choke circuit, located in the primary side, provides the correct mixture necessary for quick cold engine starting and warm-up.

Three (3) factors control the operation of the automatic choke. They are:

1. Air velocity
2. Heat
3. Manifold vacuum

Air velocity is used to create a mechanical movement of the choke valve. The choke valve is mounted "off-center" on its shaft. The air velocity against the off-set (long side) opens the valve the proper amount to allow the engine to breathe.

Heat is used to cause mechanical movement of a thermostatic coil, which is a bi-metal spring consisting of two dissimilar metals bonded together, and sensitive to changes in temperature. When the spring is cold, it rotates to close the choke valve. As the spring is subjected to heat, it expands and allows the valve to open. Heat is supplied through a tube called a "choke heat tube". This tube extends through the exhaust manifold (not into the exhaust manifold).

Manifold vacuum is converted to mechanical movement by use of a piston located within a cylinder.

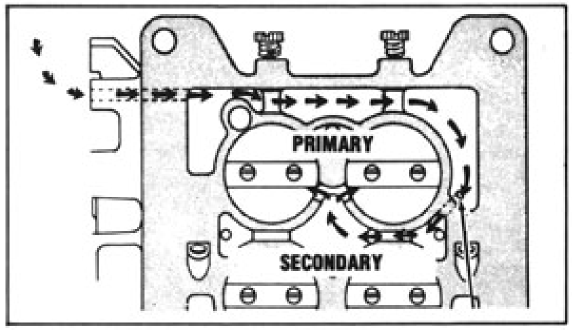
Putting these three factors together, the choke will operate as follows: When the engine is cold, the bi-metal spring is wrapped tight causing the choke valve to be in the closed position. As the engine is cranked, more air striking the long side of the choke valve causes it to open a predetermined amount to allow the engine to breathe. When the engine starts, manifold vacuum is applied to the choke piston, opening the choke valve a predetermined amount to prevent over-rich mixtures.

The thermostatic coil spring is a direct indicator of engine temperature. As the engine warms up, the thermostatic coil tension decreases allowing the choke valve to open proportionally.

During the warm-up period, the valve is always in a position relative to these three controlling factors.

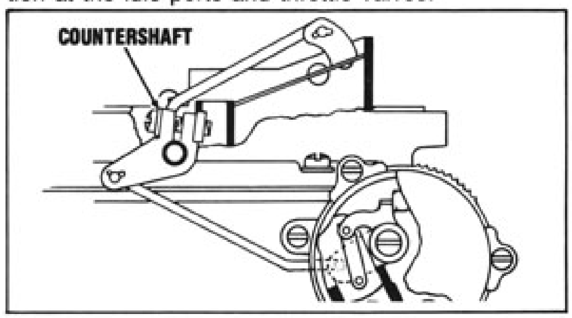
Acceleration during the warm-up period requires a slightly richer mixture. Acceleration, or throttle valve opening, is always accompanied by some loss of manifold vacuum. Lowering manifold vacuum to the choke piston allows the choke valve to close slightly, giving a richer mixture to meet engine demand.

A few early models used a water heated choke.



WARM IDLE AIR BLEED CIRCUIT

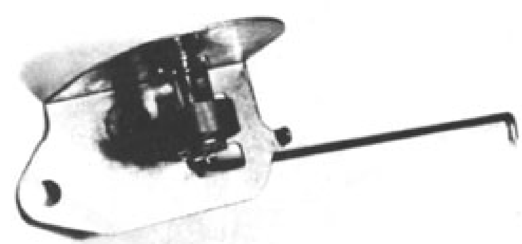
To prevent engine stall during engine warm-up on cool, humid days, some models circulate heated air from the choke housing through a passage to the base of the carburetor. This heated air helps eliminate ice formation at the idle ports and throttle valves.



COUNTERSHAFT LINKAGE

On some models, to permit lower overall height, a choke countershaft over the secondary bores connects the choke linkage to the choke valve.

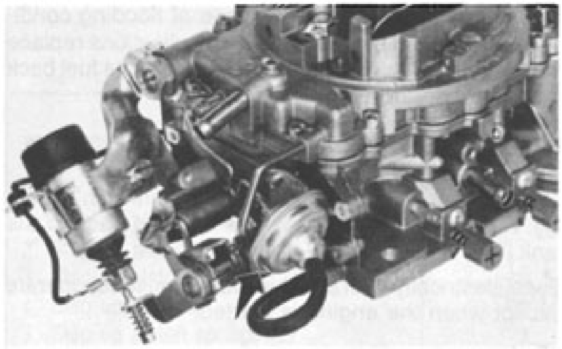
The choke shaft and fast idle cam must operate freely without any tendency to stick or bind. Remove gum or dirt accumulation on the choke operating parts by thorough cleaning.



CROSS-OVER CHOKE

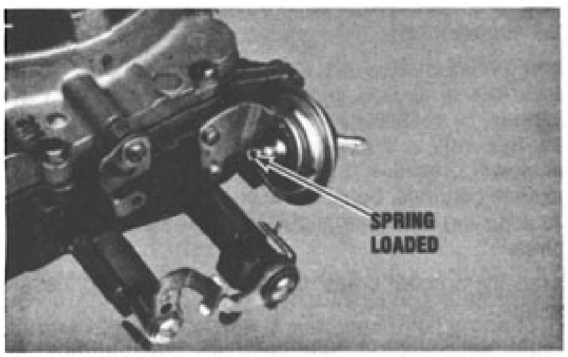
Some applications of the AFB and AVS use the integral choke while other applictions use the cross-over type choke. The cross-over design choke mounts in a pocket in the intake manifold.

When the cross-over type choke is used the carburetor mounting gasket is most important. If it is not to specified thickness, it upsets choke calibration due to the length of the choke rod. Most cross-over chokes are non-adjustable.



CHOKE PULL-OFF

On some units, the choke piston is replaced by a device called a "choke pull-off." The choke pull-off is a diaphragm type unit that performs the same function as the choke piston. It opens the choke valve to a predetermined opening when the engine starts. The amount of pull-off is adjusted by shortening or lengthening the choke pull-off rod.



MODULATED CHOKE PULL-OFF

Many units use a modulated type choke pull-off. In addition to the regular diaphragm spring, the diaphragm shaft incorporates a spring within the shaft to provide better warm-up fuel economy by allowing the amount of choke valve opening to vary with the torque of the choke coil spring. This spring loaded diaphragm shaft merely allows a tighter closed choke valve during the very early stage of the warm-up period.

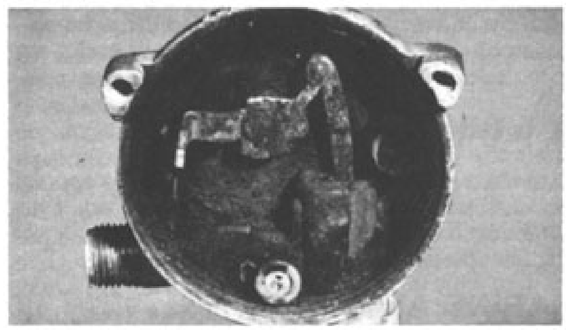
To test, apply 15 in. Hg to seat or bottom the diaphragm. If the stem of shaft moves more than 1/16 inch in 10 seconds, replace the choke pull-off assembly. A faulty choke pull-off can cause a rich condition during the warm-up period. The choke pull-off adjustment is critical and must be performed accurately. Misadjustments can cause false starts, stumble during warm-up and die-out at stops. Too much pull-off results in false starts—too little gives a loading condition.

TROUBLE SHOOTING THE CHOKE CIRCUIT

The carburetor flange mounting gasket is a part of the choke calibration when the cross-over type choke is used. A thicker or thinner gasket upsets calibration due to choke connector rod length.

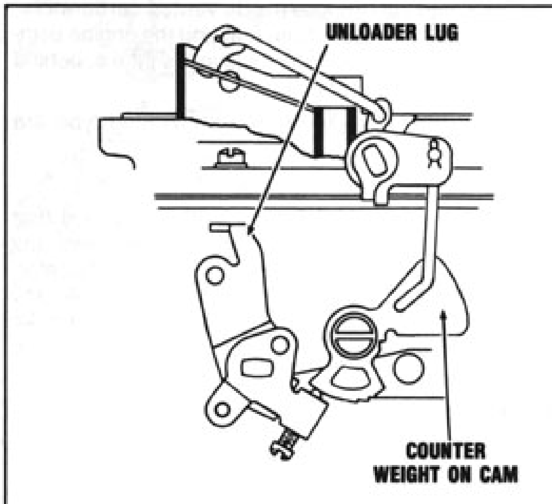
The choke cannot affect engine performance until it is running. All electrical and related tune-up work should be done prior to carburetor and/or choke diagnosis.

1. Check all linkage for any binding or sticking. Check choke valve to make certain it is free and not binding. Over-tightening the air cleaner may cause a warpage or binding.
2. Integral choke—check for air leak between choke cover and gasket. A leak in this area will slow the opening of the choke valve.
3. The choke heat tube should be free of any carbon as this, too, will delay choke opening. Check heat tube in the exhaust manifold for leaks. If it is burned out, it will allow exhaust gases to enter and damage the choke.
4. Choke setting, fast idle and unloader adjustment should be to specifications.
5. Check diaphragm choke pull-off for leaks and proper adjustment.



EXHAUST DAMAGED CHOKE

Carburetors with integral choke having a binding or stuck choke valve should be checked for a burned out heat tube located in the exhaust manifold. This is not visible from the outside but can be checked by removing the Climatic Choke cover. Whenever carbon deposits are found inside the choke housing, a burned out heat tube in the manifold is indicated.



FAST IDLE AND UNLOADER LINKAGE

FAST IDLE

During the warm-up period, it is necessary to provide a fast idle speed to prevent engine stalling. This is accomplished by a fast idle cam connected to the choke linkage. The fast idle adjusting screw on the throttle lever contacts the fast idle cam and prevents the throttle valves from returning to a normal warm engine idle position, while the choke is in operation.

All AFB and AVS carburetors use a secondary throttle lockout to eliminate secondary throttle operation during the choke cycle. The throttle lockout latch is triggered by the fast idle system.

UNLOADER

If during the starting period the engine becomes flooded, the choke valve may be opened manually to clean out excessive fuel in the intake manifold. This is accomplished by depressing the accelerator pedal to the floor mat and engaging the starter. The unloader projection on the throttle lever contacts the unloader lug on the fast idle cam and partially opens the choke valve.

A WORD OF WARNING

External carburetor linkages are designed to operate dry and should not be lubricated. If oil is used, it will attract dirt, become gummy and interfere with correct linkage operation.

MARINE APPLICATIONS

The AFB and AVS are used in many marine applications.

Although the basic circuits are the same as other applications, there are some changes and additions required to meet marine safety regulations.

Marine carburetors are resistant to corrosion that might impair the normal operation of any moving parts.

All marine installations use inside vented carburetors. This prevents fuel vapors from entering the engine compartment. Venting is permitted within the intake, behind the backfire flame arrestor.

Only carburetor gaskets of the non-wicking type are used.

A different type throttle shaft is used.

The outer ends of the shaft have a flat surface that leads to a collector ring (groove in shaft) to collect any gasoline that may leak down the bore of the carburetor. When the engine is restarted, it draws this fuel back into the bore of the carburetor and into the intake manifold, again preventing fumes in the engine compartment.

Baffles are used on the sides of the air horn to direct fuel into the primary bores in case of flooding conditions or fuel from the vents. Some applications replace the baffle with a groove in the air horn to route fuel back to the primary bores.

FUEL PUMP

The pump must not leak fuel if the diaphragm should fail. A third line returns any fuel leakage back to the tank.

Each electrically operated fuel pump must not operate except when the engine is started.

FUEL FILTER

Each fuel filter and strainer must be supported on the engine or boat structure independent from its fuel line connections, unless the fuel filter or strainer is inside a fuel tank.

SUPERCHARGED MODELS

A few AFB models were used with the Paxton "blower" type supercharger.

Air is forced directly into the carburetor air horn. The carburetor is sealed to prevent fuel leakage and to maintain its calibration. Cavities in the body casting near the ends of the throttle shafts are pressurized at full blower pressure to eliminate fuel leakage through the shaft bearings. Seals at the pump plunger shaft and idle adjusting screws provide similar protection at these points.

Internally braced brass floats were used in these models.

A light application of non-hardening sealing material which is impervious to gasoline should be applied to the venturi cluster attaching screws, pump jet cluster screws, along with all bowl cover screws.

One application used a cap on the air horn of the carburetor to adapt the blower hose. Another model used a "pressure box" which completely enclosed the carburetor.

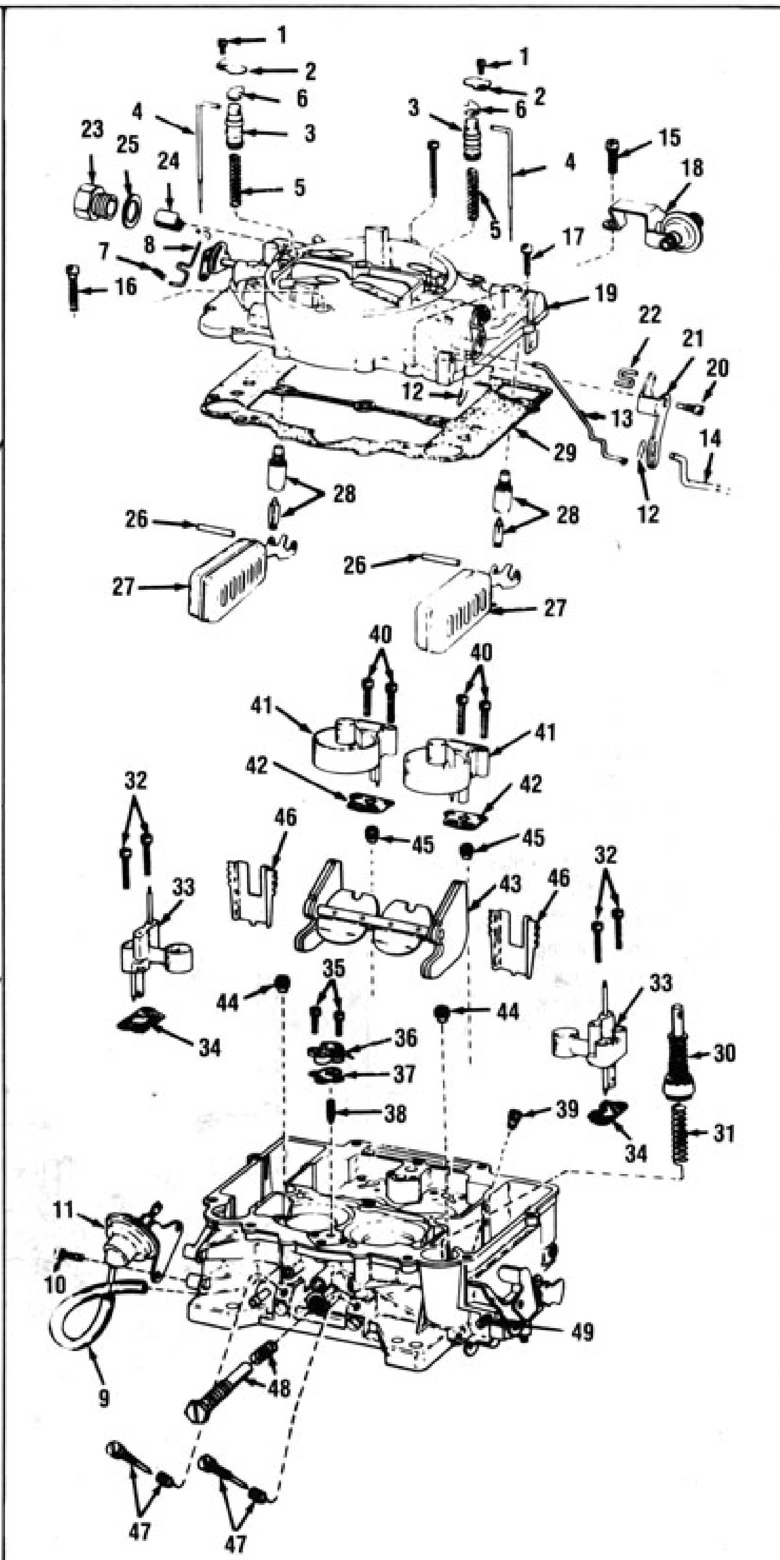
Whenever the supercharger is operating, fuel pump pressure must be increased at the same rate as air horn pressure in order to assure an adequate supply of fuel to the carburetor. A line from the blower to the upper side of the fuel pump diaphragm housing provides this required pressure increase. This line must be disconnected whenever fuel pump pressure tests are made.

On some models a fuel return line, installed between the fuel tank and the pump, allows a small quantity of fuel to flow through the pump and back into the tank. This constant flow cools the fuel and tends to prevent vapor lock during low speed operation. It also minimizes hard starting with a hot engine.

MODEL AFB
EXPLODED VIEW

PARTS LIST

1. Step up piston cover plate screw (2)
2. Step up piston cover plate (2)
3. Step up piston (2)
4. Step up rods (2)
5. Step up piston springs (2)
6. Step up rod retainer spring (2)
7. Pin spring (small)
8. Choke diaphragm connector rod
9. Hose
10. Choke diaphragm bracket attaching screws (2)
11. Choke diaphragm and bracket assembly
12. Pin spring (4)
13. Choke connector rod
14. Throttle connector rod
15. Bowl cover attaching screw
16. Bowl cover attaching screw
17. Bowl cover attaching screw (8)
18. Dashpot and bracket assembly
19. Air horn assembly
20. Pump arm screw
21. Pump arm
22. Pump connector link
23. Fuel inlet fitting
24. Strainer
25. Fuel inlet fitting gasket
26. Float lever pin (2)
27. Float and lever assembly (2)
28. Needle and seat assembly (2)
29. Air horn gasket
30. Pump plunger rod and spring assembly
31. Pump plunger spring
32. Primary venturi cluster screws (4)
33. Primary venturi clusters (2)
34. Primary venturi cluster gasket (2)
35. Pump jet housing screw (2)
36. Pump jet housing
37. Pump jet housing gasket
38. Pump discharge check needle
39. Pump intake check
40. Secondary venturi cluster screws (4)
41. Secondary venturi cluster (2)
42. Secondary venturi cluster gasket (2)
43. Auxiliary valves and weights
44. Primary metering jets (2)
45. Secondary metering jets (2)
46. Fuel bowl baffle plates (2)
47. Idle mixture screw and spring (2)
48. By-pass idle air adjustment screw and spring
49. Idle speed screw



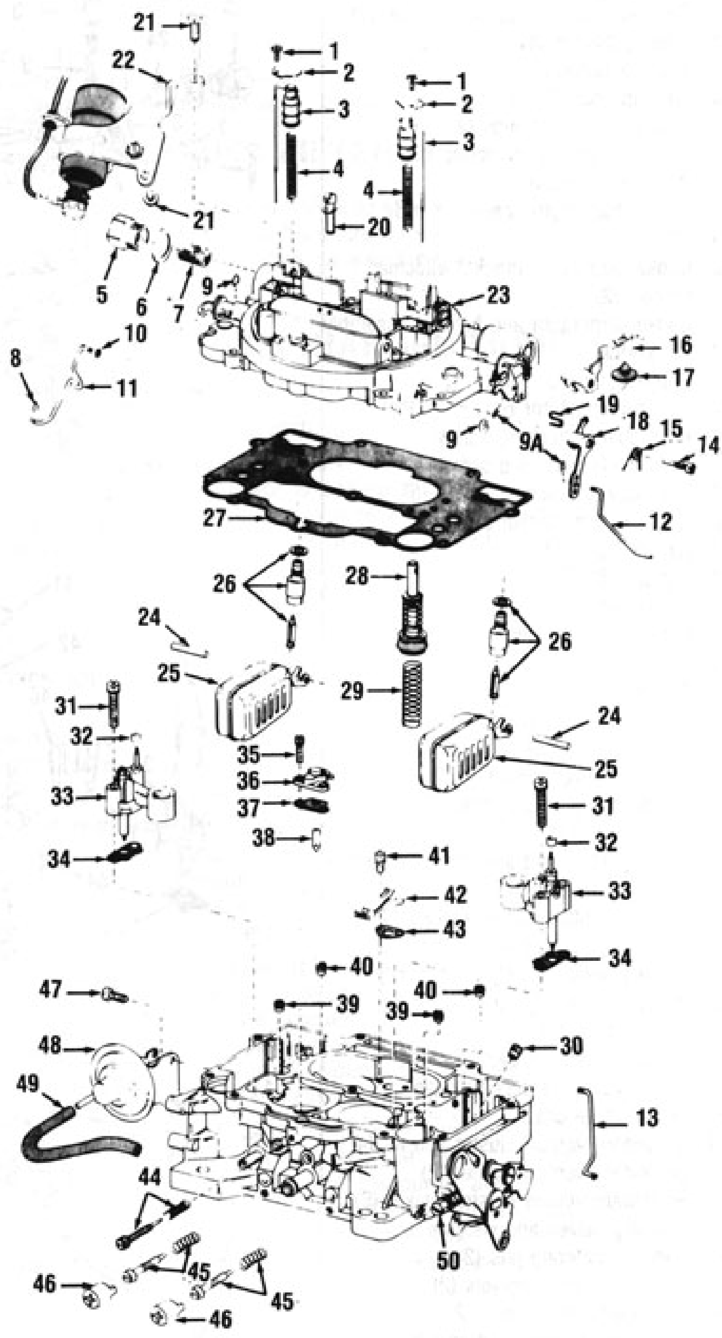
MODEL AVS
EXPLODED VIEW

PARTS LIST

1. Step up piston cover screw (2)
2. Step up piston cover plate (2)
3. Step up piston and rod assembly (2)
4. Vacuum piston spring (2)
5. Fuel inlet fitting
6. Fuel inlet fitting gasket
7. Fuel inlet fitting screen
8. Pin spring (small)
9. Retainer

9A. Pin spring (large)

10. Washer
11. Diaphragm link
12. Throttle connector rod
13. Fast idle rod
14. Pump arm screw
15. Vent arm spring
16. Vent arm
17. Vent valve
18. Pump arm
19. Pump link
20. Air horn screw (8)
21. Solenoid bracket screw (2)
22. Solenoid and bracket
23. Air horn assembly
24. Float lever pin (2)
25. Float (2)
26. Needle and seat assembly (2)
27. Air horn gasket
28. Pump plunger
29. Pump plunger spring
30. Pump intake check
31. Primary venturi screw (4)
32. Primary venturi vent seal (2)
33. Primary venturi (2)
34. Primary venturi gasket (2)
35. Pump jet screw (2)
36. Pump jet housing
37. Pump jet gasket
38. Pump discharge check needle
39. Primary jet (large orifice) (2)
40. Secondary jet (small orifice) (2)
41. Compensator valve screw (2)
42. Compensator valve
43. Compensator valve gasket
44. Idle mixture screw and spring (1968, early 1969)
45. Idle mixture screw and spring (2)
46. Idle limiter cap (2)
47. Diaphragm and bracket screw (2)
48. Diaphragm and bracket
49. Diaphragm suction hose
50. Throttle speed screw



ADJUSTMENTS

DISASSEMBLY

Remove screws, cover plates, step-up pistons, step-up rods and springs.

On Models with "S" shaped pump link note position of link for correct reassembly. Remove pump arm and pump link. Remove air horn screws noting location of different length screws so they can be reinstalled correctly. Lift air horn straight up to avoid damage to parts attached. Invert air horn and remove float pins, floats, needle-seat and gasket asemblies. It is suggested that the float on the pump side be marked so that floats can be reinstalled in their respective positions.

Remove gasket and strainer if included.

Remove pump plunger and spring from pump cylinder.

Remove primary venturi screws, venturi assemblies and gaskets. Remove pump jet housing screws, pump jet housing gasket and invert casting to remove needle. Remove pump intake check located in fuel bowl next to pump cylinder.

Remove secondary venturi screws, secondary venturi assemblies, and gaskets. If equipped, remove auxiliary throttle shaft, valves, and weight assembly. Remove primary and secondary metering jets. Some models will locate the secondary jets directly under the secondary venturis.

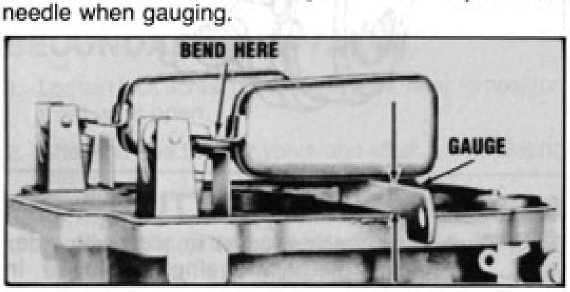
Remove idle screws and springs.

NOTE: On Cleaner Air Package carburetors (C.A.P.) do not remove idle mixture screws as these screws have limited travel and will be broken if removed. If equipped, remove idle by-pass screw and spring. DO NOT REMOVE the idle limiter caps (if equipped) from idle mixture screws unless the new service caps are available.

CLEANING

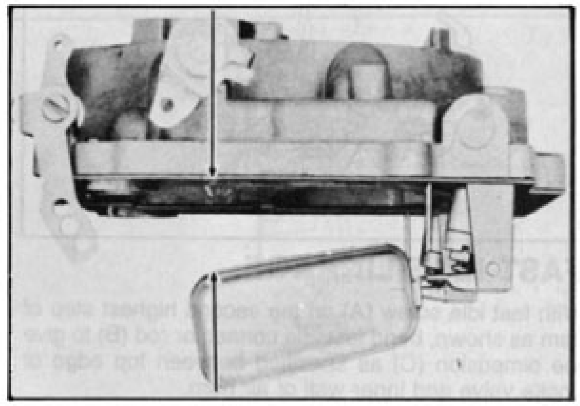
Clean all parts thoroughly in an approved carburetor cleaning solvent or lacquer thinner. Special attention should be given to carbon deposits in throttle bores and passages. Do not use a wire or similar instrument to clean passages and calibrated holes, as calibration of carburetor may be destroyed. Do not immerse diaphragm, leather, rubber or similar materials in cleaning solvent.

When adjusting floats, care must be exercised not to allow the rubber tip fuel inlet needle to be pressed into the needle seat as damage to the tip and/or a false setting will result. Allow weight of float only to seat needle when gauging.



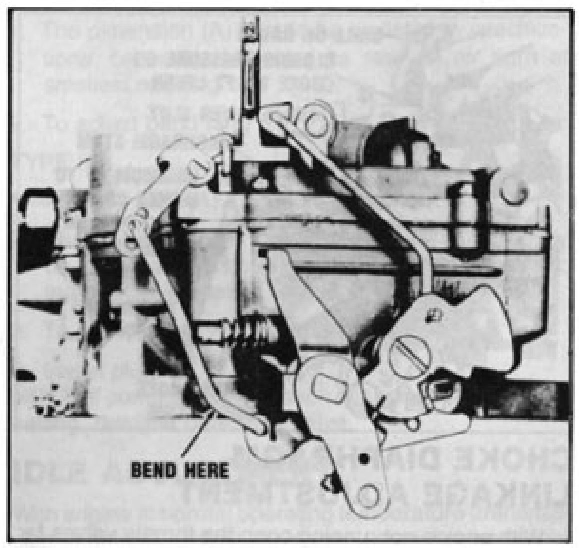
FLOAT LEVEL ADJUSTMENT

With air horn inverted and bowl cover gasket in place, bend float lever until dimension listed in specifications is obtained between top of float (at outer end) and air horn gasket. Never allow needle to be pressed into seat. Adjust float lever arms until slides of floats are parallel to the outer edge of the air horn casting.



FLOAT DROP ADJUSTMENT

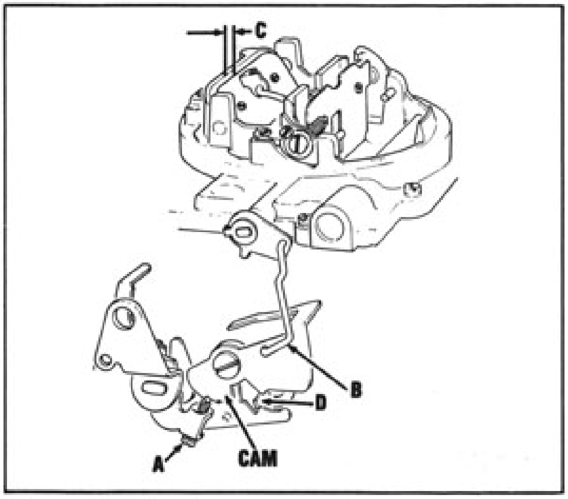
With air horn held upright and level, adjust the stop tabs on float brackets to obtain the dimension as listed in specifications between the outer end of each float and air horn gasket.



PUMP ADJUSTMENT

1. With throttle valves seated in bores of carburetor, install throttle connector rod in hole of pump arm as specified.
2. Bend throttle connector rod as shown to obtain the dimension as specified from the top of bowl cover to top of plunger shaft.

Refer to illustration for correct installation of "S" shape pump link.

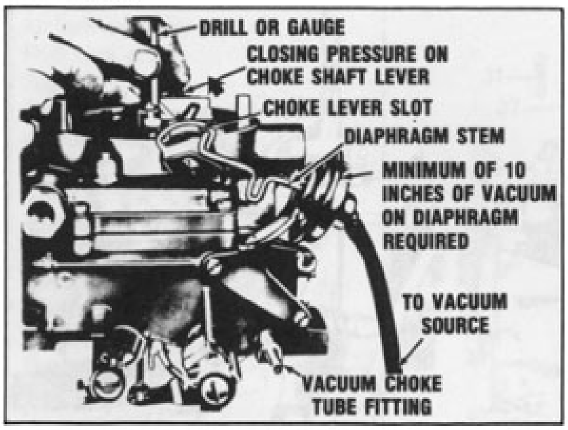


FAST IDLE LINKAGE

With fast idle screw (A) on the second highest step of cam as shown, bend fast idle connector rod (B) to give the dimension (C) as specified between top edge of choke valve and inner wall of air horn.

SECONDARY THROTTLE LOCKOUT

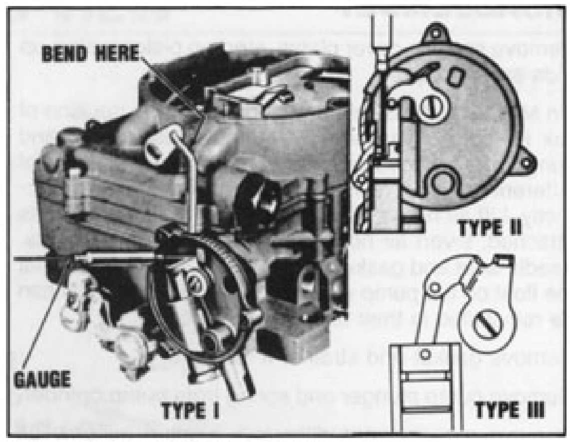
Open throttle valves and manually open and close choke valve. The tang (D) on secondary throttle lever should freely engage in notch of lockout dog. To adjust, bend tang (D).



CHOKE DIAPHRAGM LINKAGE ADJUSTMENT

1. With engine not running open the throttle valves far enough to allow the choke valve to be moved to the closed position.
2. Disconnect the vacuum hose from the diaphragm and connect the hose to another source of vacuum supply to bottom the diaphragm in housing as shown (a minimum of 10 inches of vacuum will be required).
3. Apply light pressure against choke valve shaft lever, to close choke valve as far as possible without forcing. Adjust the operating link to give the dimension as shown in specifications between top edge of choke valve and inner wall of air horn.

NOTE: Remove choke operating link to adjust to prevent damage to diaphragm.



CHOKE PISTON LINKAGE ADJUSTMENT

TYPE I

With choke valve closed, the distance between choke piston lever and stop in housing should be that listed in specifications. Adjust by loosening clamp screw of lever on countershaft arm and repositioning lever. If lever is riveted to shaft, adjust by bending connector rod.

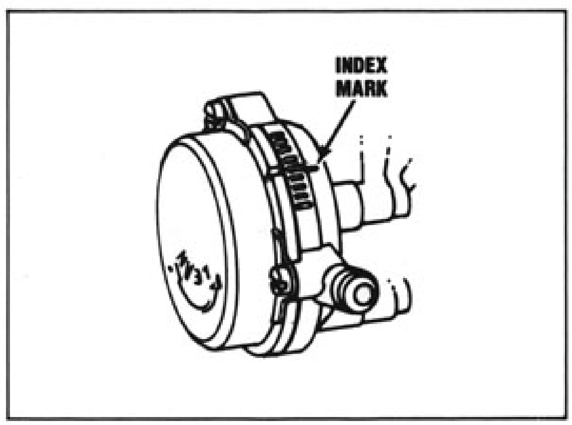
TYPE II

Open the choke valve and insert a .026" wire gauge (bent 90° ⅛" from its end) between top of slot in piston cylinder and bottom of slot in the piston. Hold throttle valve open to prevent fast idle cam from contacting adjusting screw. Close choke valve until resistance is felt against wire gauge. The distance between top of choke valve and inner wall of air horn should be that listed in specifications. Bend choke connector rod to adjust.

TYPE III

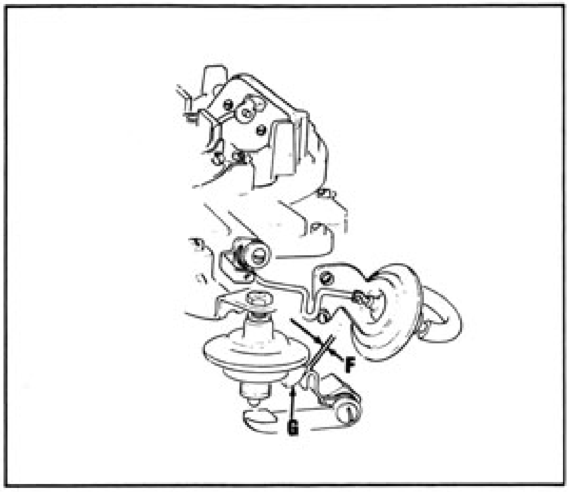
With choke valve closed, bend choke connector rod until top of piston is flush with top of piston cylinder.

Type and adjustment specifications included in Zip Kit.



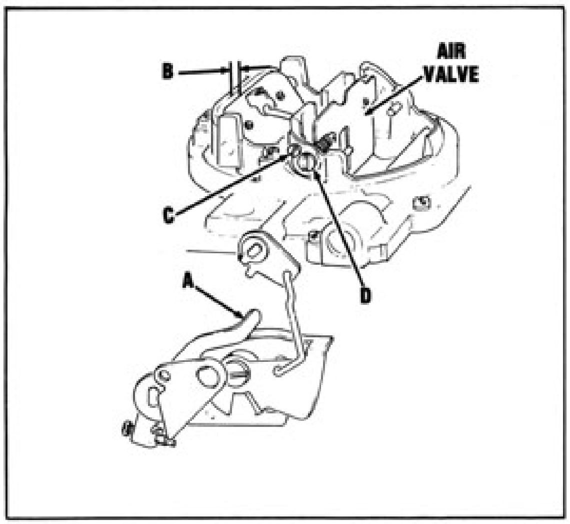
CLIMATIC CHOKE SETTING

Align notch on thermostat cover to align with index mark on choke piston housing as listed in specifications.



SECONDARY THROTTLE LEVER

With primary and secondary throttle valves tightly closed. The dimension (F) should be .020 inch between the positive closing shoes on throttle shaft levers. To adjust bend shoe (G) on secondary lever.

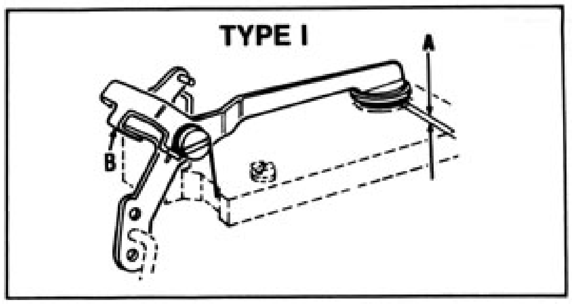


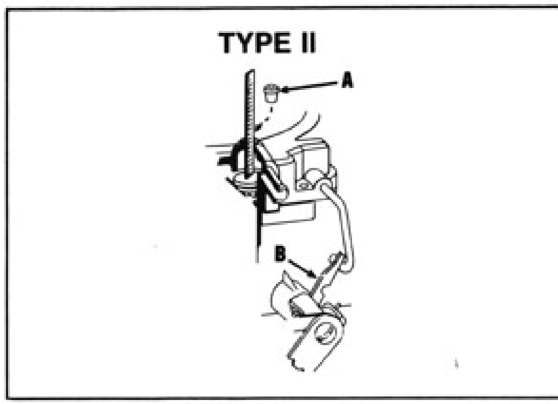
UNLOADER ADJUSTMENT

With throttle valves wide open, close choke valve as far as possible without forcing. Bend unloader tang on throttle lever to obtain the dimension as listed in specifications between upper edge of choke valve and inner wall of air horn.

SECONDARY AIR VALVE

1. Loosen lock screw (C) and allow air valve to position itself wide open.
2. Check to see that air valve and shaft are operating freely.
3. To adjust, turn the shaft bearing (D) counterclockwise until the spring just contacts air valve, then turn the shaft bearing two additional turns.





BOWL VENT

With the throttle valves closed (at Curb Idle) determine the proper type vent, then proceed as follows.

TYPE I

1. The dimension (A) should be as listed in specifications, between valve and its seat on air horn at smallest opening.
2. To adjust bend tang (B).

TYPE II

1. Remove plug (A) from hole in air horn.
2. Insert a narrow ruler in hole. Allow ruler to rest lightly on top of valve. The dimension from top of valve to top of hole in casting should be as specified.
3. To adjust bend valve operating lever (B).
4. Install plug.

NOTE: If pump stroke has been changed from standard setting, readjust bowl vent valve.

IDLE ADJUSTMENT

With engine at normal operating temperature (transmission in neutral), adjust idle speed screw for the proper RPM as listed in specifications. Adjust both idle mixture screws "in" and "out" until smoothest idle is obtained.

NOTE: On models using the by-pass idle air adjustment screw, instead of idle speed screw, the throttle valves remain seated at idle. To adjust, proceed as follows:

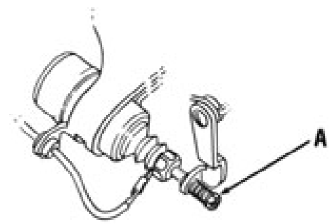
1. Open by-pass air screw approximately two full turns from seated position.
2. Open idle mixture screws 1 to 1½ turns from the seated position.

3. Start engine and adjust by-pass air screw for the proper RPM as specified (transmission in neutral).
4. Turn mixture screws "in" or "out" to obtain the smoothest idle. Repeat steps 3 and 4 if necessary.

IDLE SPEED

With engine at normal operating temperature turn throttle speed screw to the RPM speed as shown on tune-up decal located in engine compartment. Turn mixture screw on the 1968 and early 1969 carburetors until the smoothest idle is obtained.

Replace limiter caps on the later models.



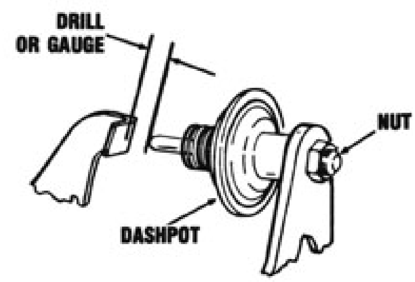
IDLE SPEED SOLENOID— IF SO EQUIPPED

1. With engine at normal operating temperature, attach a tachometer and turn screw (A) to the idle speed RPM shown on tune-up decal in engine compartment.

With engine still running, adjust slow curb idle speed screw until end of screw just contacts the throttle lever, then back off one complete turn.

FAST IDLE ADJUSTMENT ON CAR

With choke valve wide open on hot engine, place fast idle speed screw on the lowest speed step of cam. Adjust the speed screw to obtain the RPM listed in specifications, with the transmission "in neutral."



DASHPOT

With throttle valves closed (at curb idle) and diaphragm stem fully depressed adjust dashpot to give the clearance of ⅛" between dashpot stem and throttle lever.

BUILT TO MEET OR EXCEED O.E. SPECS.

ELECTRIC PUMP

- Weight - 2 lb., 6 oz.
- Rotary Vane design
- Pressure Regulated
- No inlet or outlet valves
- 72 gph Free-Flow
- Operates at 160° temperature
- 1/4" inlet and outlet fittings
- Lift - 8'
- P4070 - 12 volt, 5 psi
- P4259 - 6 volt, 5 psi
- P4389 - 12 volt marine, 5 psi
- P4594 - 12 volt, 7 psi

MECHANICAL PUMP

- Aluminum castings to dissipate heat
- Light weight
- Channel steel levers
- Unitized diaphragm/shaft/spring/seal
- Resilient valves, self conforming to seat
- Rolling-Loop diaphragm
- Delivers 45 gph with 4 psi restriction

12 VOLT IMPORT APPLICATIONS

- Universal mounting bracket and hardware
- Bayonet fittings for either 5/16" or 1/4" hose
- Single screw for pressure adjustment
- Pressure adjustable from 1-3/4 psi to 6 psi

IN-TANK ELECTRIC PUMP

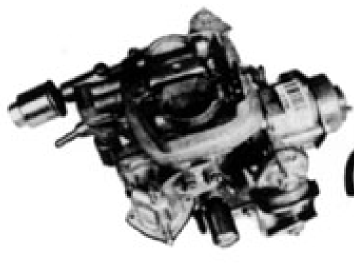
- For carburetor equipped vehicles
- Current draw - 1.4 amps
- 20 gph at 4 psi

IN-TANK ELECTRIC PUMP

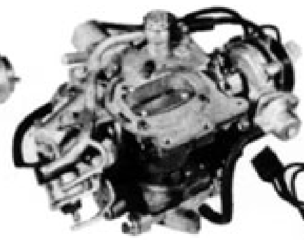
- Used with Throttle Body Injection
- Current draw - 4 amps
- Continuous delivery - 20 gph at 12 psi
- Excess fuel returned to tank

TECH. MANUAL		WITH COLOR SLIDES
TYF	FORM #3560	CTP-21
740	FORM #3624	CTP-20
BBS	FORM #3620A	CTP-5A
BBD-1¼"	FORM #3576A	CTP-6A
YF-YFA	FORM #3608B	CTP-22
RBS	FORM #3625	CTP-8A
TQ	FORM #3623A	CTP-1A
AFB-AVS	FORM #3703A	CTP-23
BASICS	FORM #3630A	CTP-2A

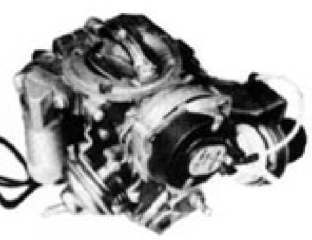
AFB-AVS
SERVICE MANUAL
CARTER CARBURETOR



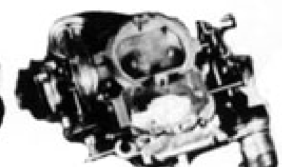
CARTER-WEBER 740



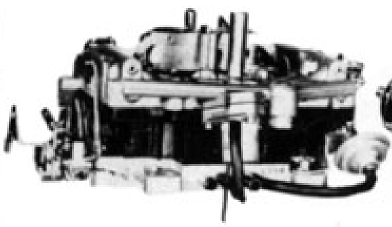
CARTER-WEBER TYF



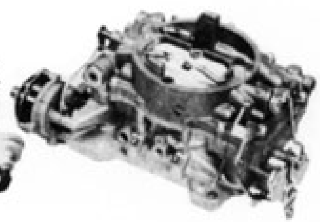
CARTER YF-YFA



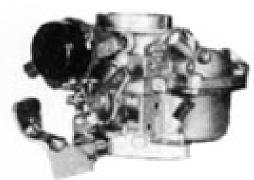
CARTER BBD 1-1/4"



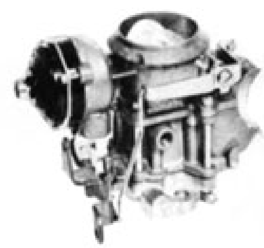
CARTER THERMO-QUAD™



CARTER AFB-AVS



CARTER RBS



CARTER BBS

FEDERAL MOGUL

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