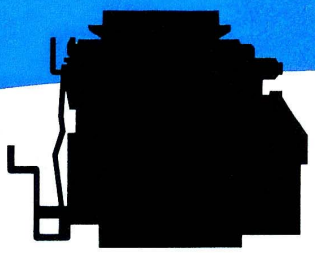
MASTER TECHNICIANS SERVICE CONFERENCE 66-6

REFERENCE BOOK

more about carburetors



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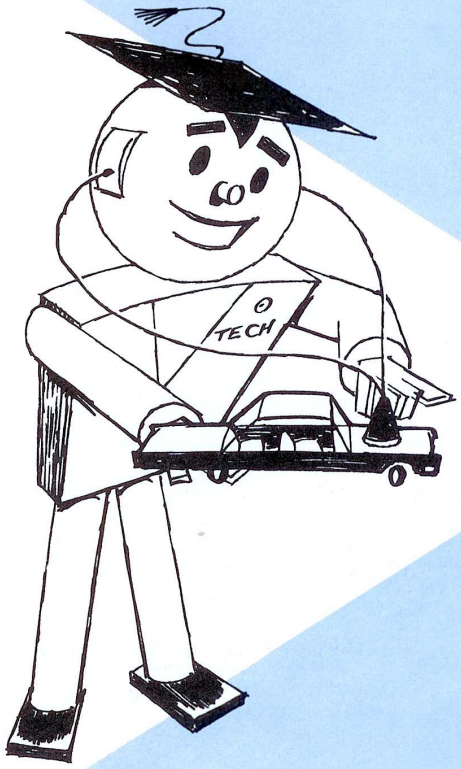
Diagnosis depends on Know-How

Since our last session, you've had time to digest the basics of carburetion, and you're probably all primed with questions about applying this knowledge to diagnosing carburetor trouble.

You now know there's more to all those rods, levers and valves than meets the eye . . . so we'll try to cover the major "question" areas by explaining how carburetor systems are interrelated by their linkage, and why this linkage must be accurately set and adjusted to get good carburetor operation.

Once you understand the effects of correct and incorrect adjustments, you can use this know-how in analyzing carburetor troubles . . . you'll be able to do a better all-around job of diagnosing car performance problems.



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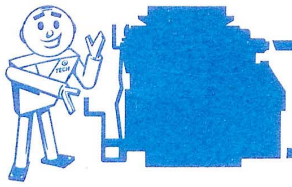


GENERAL LINKAGE OPERATION

Our session on fundamentals gave you a good start toward understanding carburetor systems and overall carburetor operation. But, as with all basic explanations, the treatment had to be general so the information could be applied to any of our carburetors.

To help you put this general knowledge to work in the shop, this reference book will expand on the basics to describe linkage operation and show how service adjustments affect the performance of carburetor systems.

Although linkage arrangements of other models differ from that of our example, their basic systems all produce similar end results. So, when you understand how the linkage works on one, you can easily adapt your know-how to others.

We'll cover the basic carburetor systems where adjustments and settings apply, starting at the main point of control . . . the throttle lever.

THROTTLE LEVER

All carburetor linkage action begins with throttle lever movement. In starting, warmup and idling, acceleration, heavy power pulling, intermediate or high speeds, the driver controls each carburetor system function directly or indirectly by moving the accelerator pedal.

As you'll recall from our previous session, the air/fuel ratio must be varied along with the throttle opening so that the engine will get the correct mixture for all speed and load conditions. It follows then, that operation of the basic carburetor systems must be closely related to throttle valve movements if the carburetor is to do its work efficiently.

Two adjusting screws hold the throttle open a specific amount to regulate engine idle speed. One controls curb idle when the choke is open, the other determines the fast-idle during the warmup period.

ACCELERATOR PUMP

Essentially, the accelerator pump adds a spurt of fuel to compensate for the momentary lean condition that occurs when the throttle is opened suddenly to accelerate from low or intermediate speeds.

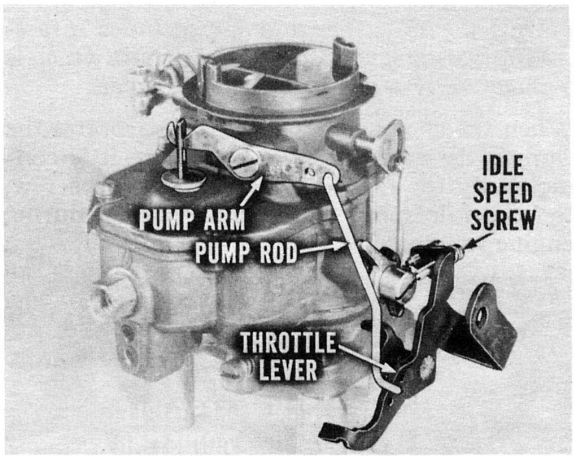


Fig. 1—Accelerator pump adds fuel

Pump operation must be proportional to the amount the throttle is opened to prevent engine stumble on sudden acceleration.

PUMP LINKAGE

The accelerator pump linkage of our typical carburetor includes a pump plunger with an attached bowl vent valve, a rocker arm, and a pump rod which connects the arm to the throttle lever. As in most carburetors, the throttle lever provides three optional pump settings to suit the needs of average or extreme driving conditions.

When the throttle closes, the pump rod and rocker arm pull the plunger upward against spring pressure to ready it for pump output action. Upward movement of the plunger also lifts the bowl vent valve off its seat when the throttle closes to curb-idle position. The valve is opened a specific amount . . . an important setting because it also determines pump stroke.

When the throttle opens, the rocker arm moves downward in a slot in the plunger shaft, allowing the spring inside the carburetor to push the plunger downward, closing the vent valve and discharging the required amount of extra fuel.

Because the power and high-speed systems take care of mixture needs above the intermediate speed range, the pump plunger is designed to reach full stroke at about half throttle. As a result, there's no pump discharge action beyond this half-way point.

FAST-IDLE LINKAGE

The throttle lever also works with the choke fast-idle linkage to control engine idling speed during warmup. The linkage includes a fast-idle operating lever on the choke shaft which is connected by a rod to the fast-idle cam.

When the choke closes, the linkage rotates the cam to the fast-idle position where it is contacted by the fast-idle speed adjusting screw, to keep idle speed higher than normal during engine warmup.

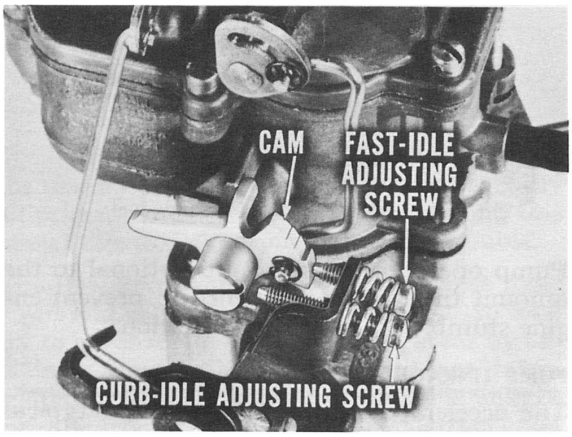


Fig. 2—Choke controls idle cam position

Then as the choke gradually opens, the cam continues to follow choke movement, reducing idle speed step by step, until it reaches "off" position where the cam steps are no longer contacted by the fast-idle speed adjusting screw. However, when the engine is turned off, the speed screw blocks the cam and keeps it from rotating back to fast-idle position as long as the throttle remains closed. This also prevents the choke thermostatic coil from closing the choke valve as the engine cools.

To begin the choking cycle again when starting a cold engine, the accelerator pedal must be pressed down part way to move the fast-idle speed adjusting screw away from the fast-idle cam. This frees the linkage, allowing the thermostatic coil to close the choke and move the fast-idle cam back to the fast-idle position.

Fig. 3—Pedal releases fast-idle cam

THE CHOKE UNLOADER

The throttle lever also has a choke unloader feature to help you start a cold engine which has been flooded. It's simply a tang on the throttle lever which contacts a similar tang on the fast-idle cam to move the choke valve part way open when the throttle lever nears wide-open position.

Since there's no need for unloader action when the choke is open, the unloader tang contacts the fast idle cam *only* when the fast-idle linkage is in fast-idle position.

TWO-PART CHOKE LINKAGE

On the other side of the carburetor, we have a double linkage arrangement connected to the choke valve operating lever. One part closes the choke valve for starting and holds it closed the amount needed for smooth engine operation during warmup. The other section works in the opposite direction to balance the choke closing force, and opens the choke valve gradually as the engine warms up and needs less and less of a rich mixture.

The choke closing linkage: The outer arm of the choke valve lever connects to a choke rod from the thermostatic spring coil located in the engine's intake manifold. The action of this part of the linkage is quite simple. When it's cold, the coil contracts, producing a windup movement which raises the choke rod to close the choke valve. But, as we've mentioned before, the choke can close only after the accelerator is pressed down part way to release the fast-idle cam.

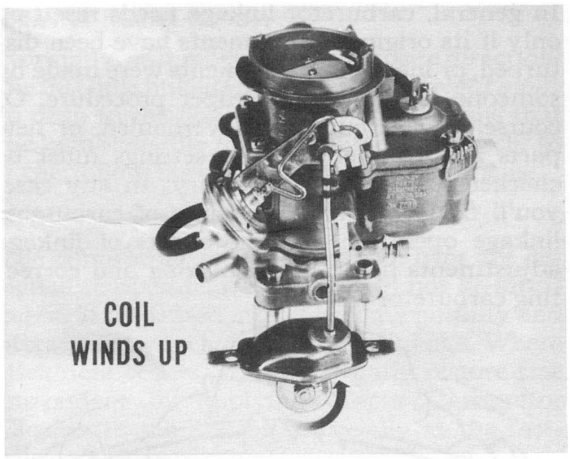


Fig. 4—Thermostatic coil closes choke

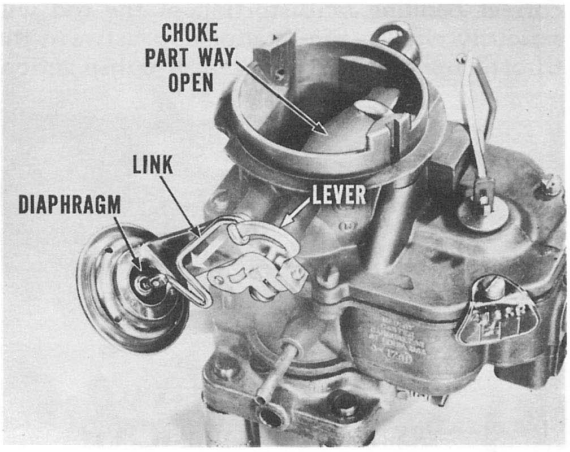


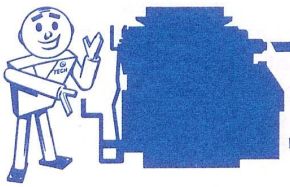
Fig. 5—Diaphragm opens choke part way

After starting, as the engine warms up, the thermostatic coil gradually unwinds allowing the force of intake air to move the choke valve farther and farther open as the need for choking action becomes less.

The choke opening linkage: The "opening" part of the choke operating linkage includes a vacuum diaphragm connected by an operating link to the inner arm of the choke valve lever. The diaphragm moves inward full travel as soon as the engine starts. This movement pulls on the choke lever's inner arm, opening the choke valve part way to admit the air needed for engine operation. The choke lever's inner arm is slotted to permit the choke valve to close completely when the engine is cranking to start.

SUMMING UP

Up to this point, our coverage of carburetor system operation has been simplified for the purpose of acquainting you with the linkages. Details on servicing systems and linkages will be found in the following sections of this book.



LINKAGE DESIGN AND SERVICE PRECAUTIONS

LINKAGE DESIGN CONSIDERATIONS

Linkage design is an important point to understand because the bends which shape these rods are carefully designed to produce specific movements of the levers and parts that they are connected to. When you consider the distorted appearance of some rods, it may seem odd to say that you can distort them. But that's exactly what can happen if rods are bent incorrectly either by accident or when making a regular adjustment.

SOME BENDS ARE FUNCTIONAL

Some rods are specially shaped to link up levers that operate on different center lines. The accelerator pump linkage of our typical carburetor gives us a good example of this with a rocker lever working nearly at right angles to the throttle lever which moves it.

If you move the throttle toward open position, you'll notice the connecting rod raises the rocker arm uniformly until the throttle is nearly half open. Then, as you continue to open the throttle, the connecting rod passes over center at the throttle lever end, and rocker arm movement practically stops.

You'll recall from the linkage description that accelerator pump action is not needed when the power and high-speed systems are operating, so it's easy to understand the reason for this linkage action. You can also see how in-

correct bending or distortion of the rod will seriously change the relationship between the throttle opening and accelerator pump action.

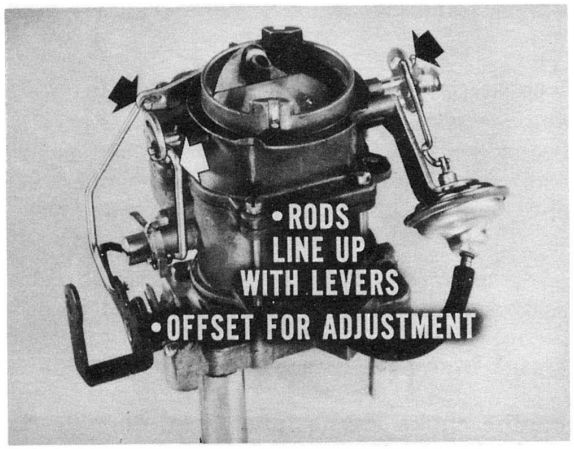


Fig. 6—Rod shapes are functional

SOME BENDS PROVIDE CLEARANCE

In addition to their functional design, rods are also shaped so they will not contact other carburetor or linkage parts as they move. Here again, correct adjustment is the key to proper linkage operation. For example, if the accelerator pump rod is improperly bent, it may rub on the throttle lever and cause binding when moved full range.

YOU MUST BEND RODS CORRECTLY

The important thing to remember when you adjust any linkage rod is to bend it only in the place and manner specified for resetting, as given in your service manuals.

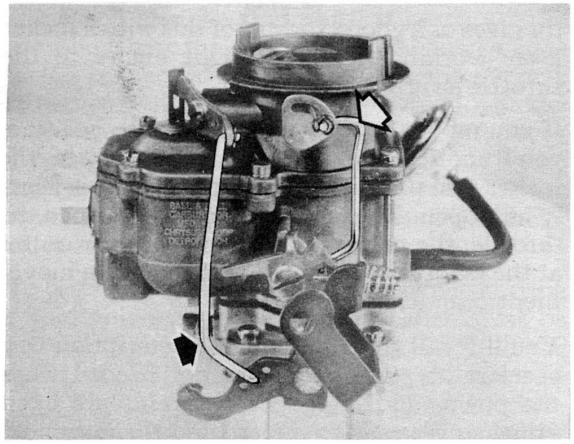


Fig. 7—Bend rods where specified

In general, carburetor linkage needs resetting only if its original adjustments have been disturbed, or incorrect adjustments were made by someone not following proper procedure. Of course, if a carburetor is overhauled, or new parts are installed, linkage settings must be checked and reset if necessary. In any case, you'll find your understanding of carburetor linkage operation and the effects of linkage adjustments helpful in analyzing and correcting carburetor problems.

LINKAGE LOOSENESS IS BUILT IN

Although linkage must be adjusted exactly to coordinate the action of the carburetor's systems, the rods also need a certain amount of clearance at their connecting ends so they will not bind or jam when the linkage operates.

This clearance may seem excessive in view of the precise settings called for in your service manuals. However, these clearances are considered in the design. During operation, the slack is taken up so that the settings are correct. Rod end clearance also helps to reduce binding or sticking caused by dirt or gum accumulations on the carburetor linkages.

WHEN THE THROTTLE MOVES . . .

Linkage action is positive where it is directly connected to throttle lever movement. This means that these sections are less sensitive to dirt or gum, and usually require only periodic cleaning and lubrication to keep them in good operating condition.

THE CHOKE TURNS IT "ON"

The fast-idle linkage works differently and is therefore less tolerant to sticky conditions. Fast-idle linkage movement is positive only when the choke thermostatic coil moves the choke valve closed. Even here, if the fast-idle cam sticks on its pivot, the choke coil may not be able to close the choke and raise the fast-idle linkage to fast-idle position.

GRAVITY TURNS IT "OFF"

Normally, as it moves in the opposite direction, the fast-idle linkage depends on *its weight alone* to drop to the "off" position. This means that the complete idle linkage must move freely so it can follow the choke as it gradually opens.

KEEP IT DRY AND CLEAN

The connecting rod and fast-idle cam are designed to operate dry and should not be lubricated. If oil is used, it will become gummy and attract dirt which can jam the linkage. Where stickiness occurs, you can usually restore free movement by applying Mopar Carburetor Cleaner to the linkage, especially at the fast-idle cam pivot.

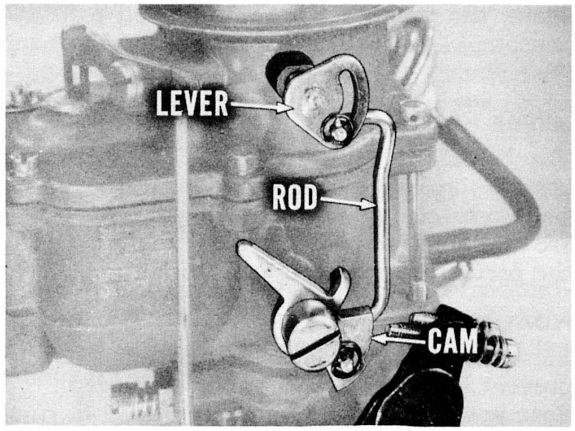
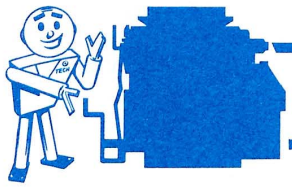


Fig. 8—Linkage should not be oiled



LINKAGE ADJUSTMENTS AFFECT PERFORMANCE

ACCELERATOR PUMP

As we mentioned earlier under linkage design, when you bend the accelerator pump rod, it changes the relationship between the distance the throttle opens and the amount of fuel the accelerator pump discharges.

If the rod is too long, the pump won't deliver enough gas for smooth acceleration and the engine may stumble when the pedal is pushed down. Where the rod's shorter than the specification setting, the pump delivers too much fuel and may also cause an acceleration stumble . . . this time slightly delayed.

PUMP ADJUSTMENT

As specified for our typical carburetor, the accelerator pump rod is adjusted with its bottom end in the middle or medium stroke hole of the throttle lever. This provides a basic starting point for the pump rod adjustment, which is measured at the bowl vent on this model. When you bend the pump rod for a vent valve setting, it also adjusts the rod for the basic pump stroke at the same time.

HOLES CHANGE STROKE

Three stroke setting holes are provided so you can change pump stroke without bending the pump rod. To get a longer stroke, you simply move the rod end to the outer hole, away from the throttle shaft. For a shorter stroke, the rod goes in the inner hole of the throttle lever, closest to the throttle shaft.

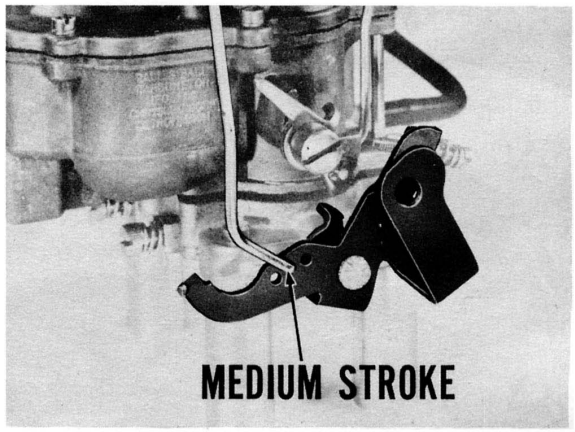


Fig. 9—Use middle stroke hole for rod adjustment

Originally, the long stroke setting was intended for winter weather, but is seldom needed with today's gasolines. However, this setting may still be needed in some northern areas where very low temperatures persist for long periods. The short stroke setting reduces pump discharge volume to prevent loading the engine with a rich mixture when operating in areas with consistently high temperatures. Here

again, the pump setting is intended to compensate for an extreme condition and not for general use.

MIDDLE HOLE BEST FOR MOST CONDITIONS

You'll find the medium-stroke setting works best for average driving and weather conditions year-round because most gasolines today are "tailored" to have the proper volatility for the prevailing operating conditions.

FLOAT BOWL VENT VALVE

Most of our carburetors have a vent valve to prevent build-up of fuel vapor pressure in the float bowl when the engine is stopped or running at curb idle. If the bowl is not vented, heat expansion can force vapor or raw fuel into the manifold, flooding the engine.

BOWL VENT OPEN AT IDLE ONLY

The vent valve should be open only when the throttle lever is at or near curb-idle position. If it remains open at higher speeds, it exposes the float bowl to atmospheric pressure, cancelling the effect of the balance tube in the carburetor air horn.

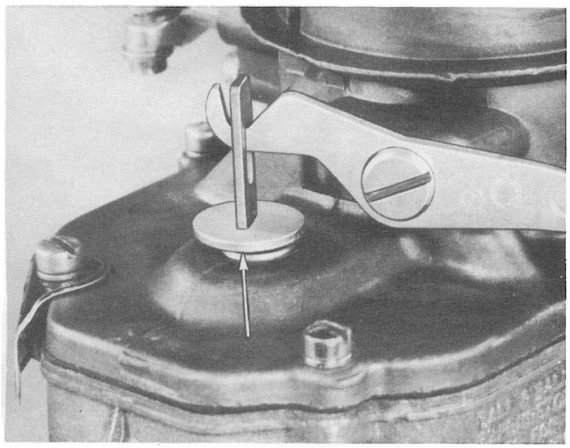


Fig. 10—Vent opens at curb idle

This tube, as you know, is designed to keep float bowl air pressure about the same as intake air pressure in the carburetor air horn. Should the pressure balance be upset by opening the bowl vent at speeds above idle, the carburetor may run too rich, especially if the air cleaner is partly clogged.

BOWL VENT ADJUSTMENT

Vent valve location and adjustment varies according to the carburetor make and model, so you'll have to refer to your service manuals for specific adjusting procedure. As mentioned earlier in the linkage description, our typical carburetor has its bowl vent valve located on the accelerator pump plunger stem. A clip, under the vent valve, lifts the valve off its seat a specific distance when the plunger is raised by closing the throttle. The valve opening must be accurately adjusted, so be sure the valve does not raise too far or you may cause a serious drop in low-speed fuel economy.

Move rod and valve together: Before checking the vent valve setting, make sure the pump rod is in the center stroke hole of the throttle lever and the valve lifting clip is in the middle slot on the pump plunger stem. If the pump rod is moved to another setting after the vent valve is adjusted, you'll have to move the valve clip to a corresponding slot on the pump plunger stem. Use the upper clip position with a short pump stroke, and the lower for a long stroke.

FAST-IDLE LINKAGE ADJUSTMENT

We've already covered fast-idle linkage operation in some detail, but there are a few precautions to keep in mind when you check or adjust the linkage.

Bending the fast-idle connecting rod determines which step of the fast-idle cam the fast-idle speed adjustment screw will contact when the choke is closed or anywhere in the fast-idle range. If the rod is too long, the speed setting may be low and the engine will tend to load up and stall during warmup. At the other extreme, if the rod's too short, the fast-idle cam may not reach the full "off" position and will keep engine speed higher than necessary when the choke is open.

When adjusting the rod, bend it only at the place specified in your service manual, and be very careful not to distort it in any way or the linkage may bind.

TEST FOR BINDING

First disconnect the thermostatic coil rod from the choke lever so it will not interfere with the test. Then move the throttle part way open so the fast-idle cam is clear of the fast-idle speed adjusting screw. Close the choke valve with your finger to raise the linkage to fast-idle position and then release it so the linkage can move down by its own weight.

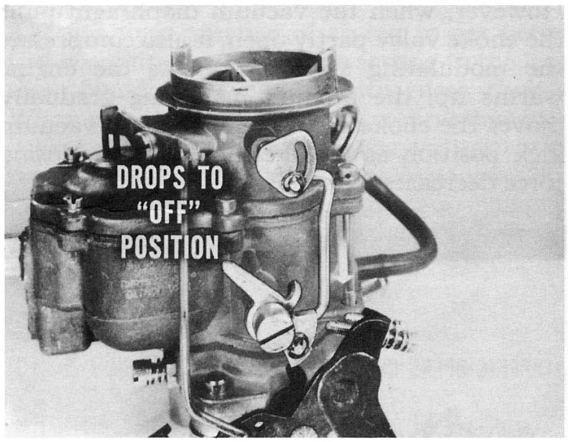


Fig. 11—Linkage must move freely

The linkage should drop freely to its "off" position with no sign of sticking. If binding occurs, check the connecting rod ends for proper alignment and make sure the fast-idle cam pivot and the choke valve shaft are free from dirt and gum.

CHOKE UNLOADER SETTING

The unloader adjustment must be done carefully to get the proper effect. If the unloader opening is not adequate, flooding may become worse instead of clearing up when the engine is cranked with the throttle held wide open.

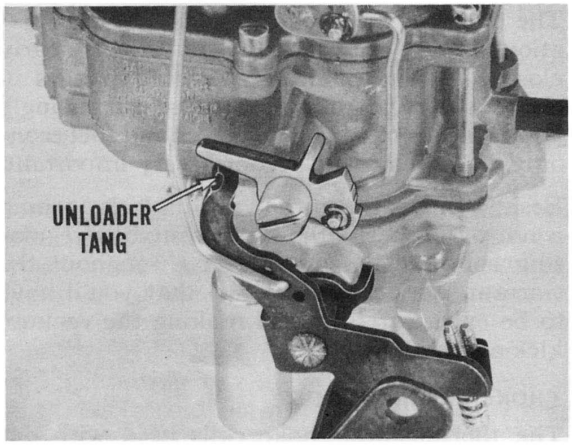


Fig. 12—Bend tang carefully

You'll notice in the service manuals that the unloader is adjusted by bending a tang on the throttle lever. This in itself is easy enough, but it must be done carefully so the tang will not be broken off.

CHOKE VALVE CONTROL

The choke operating linkage performs a balancing act—with the thermostatic spring coil pushing on the choke lever to close the choke valve, and the vacuum diaphragm pulling in opposition to open it. Above all, we should understand that the choke performs two distinct functions—one for starting and the other for warmup.

First, it closes to help the engine start by building up the manifold vacuum needed to draw a fuel mixture from the carburetor when the engine is cranking.

Then after the engine starts, the vacuum diaphragm pulls the choke open far enough to prevent flooding and also regulates the mixture needed for smooth power during engine warmup. And, as you already know, the choke closing also rotates the fast-idle cam into position to keep the cold engine running fast enough to prevent stalling at low speeds.

CHOKE OPERATION WHEN CRANKING

If the engine turns over at normal cranking speed, and choke closing force is average, the choke valve will open part way as intake air enters the engine. However, the thermostatic coil's closing force increases as the temperature drops, and in extreme cold weather, it could build up enough to interfere with choke opening. This can make starting very difficult, especially when cranking speed is also slowed by the cold.

THE STAGING SPRING

To prevent extreme-cold choking problems,

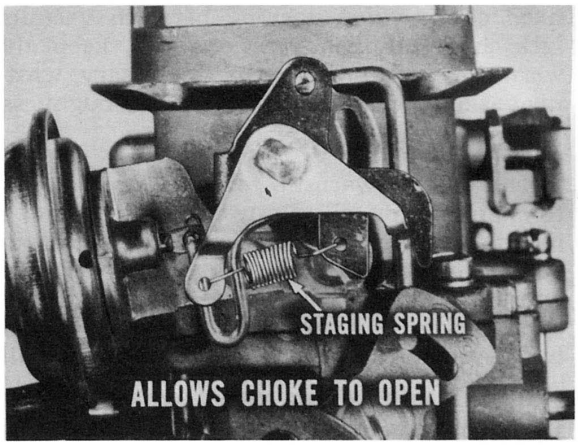


Fig. 13—Spring limits choke closing force

some of our carburetor choke linkages include a staging spring which limits the force holding the choke valve closed . . . sort of a "safety valve" arrangement that opens when the thermostatic coil's torque is higher than average.

Staging spring tension is designed to hold the choke valve closed initially for good choking action. If the spring is stretched or distorted in any way it should be replaced. As with the choke unloader, the choke staging mechanism is adjusted by bending a tang to permit the correct choke valve opening. Consult your service manuals for proper adjustment procedure on specific carburetor models.

VACUUM KICK OPENS CHOKE

When the engine starts, the choke vacuum diaphragm moves inward full travel, pulling the choke operating link with it. This movement, called the vacuum kick, pulls the choke valve open a controlled amount to provide the proper mixture for smooth operation after the engine starts. A fairly rich mixture is needed at this stage because mixture distribution in a cold engine tends to be uneven and may cause poor idle or stalling.

WARMUP RELAXES CHOKE COIL

As the engine warms up and the mixture vaporizes more easily, there is less need for a rich mixture, so the amount of choking can be correspondingly reduced. Basically, this is what happens as the thermostatic coil warms up and loses its closing torque. However, with only the force of intake air working to open the valve, the choke will tend to stay in the vacuum kick position until the thermostatic coil is completely relaxed. It's easy to see that a relatively fixed choke valve opening between vacuum kick and full-open positions will keep the warmup mixture richer than necessary, wasting gas and possibly causing engine roughness.

SPRING OPENS CHOKE VALVE

To match the warmup mixture more closely to engine needs, all of our carburetors have a modulating spring which works with the choke vacuum diaphragm to open the choke valve gradually. The design and location of this spring varies with carburetor make and model, but its operating principle is the same for all.

HOW THE MODULATING SPRING WORKS

In general, choke linkage operation remains the same as without the modulating spring. However, when the vacuum diaphragm pulls the choke valve partly open, it also compresses the modulating spring. Then as the engine warms up, the modulating spring gradually moves the choke valve open from the vacuum kick position as the thermostatic coil closing force decreases.

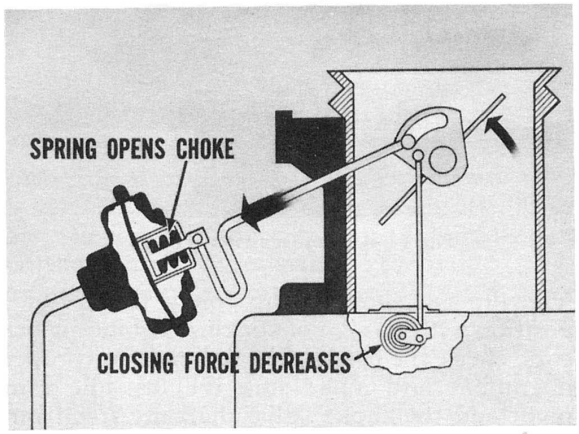


Fig. 14—Spring opens choke gradually

This constant balance between modulating spring force and thermostatic coil force produces a positive, gradual change of choke valve position, coordinated with the mixture needs of the engine.

VACUUM KICK ADJUSTMENT

The effect of the choke valve on engine operation is most critical when the valve is nearly closed. At this point, very small changes in choke valve position can cause surprisingly large variations in engine power and fuel economy, so adjustment becomes very important.

Besides this, if the initial vacuum kick opening is not set properly, the choke's mixture regulating action will be incorrect throughout the warmup period. This means that you'll have to be extra careful when making the vacuum kick adjustment.

CHOKE CHARACTERISTICS

The thermostatic choke coils used with our current carburetors are designed to move a specific amount for each degree of temperature change. This movement is matched to the carburetor and its linkage to give starting and warmup operation that suits specific engine needs all year round . . . no special winter or summer settings are necessary.

LEAVE WELL ENOUGH ALONE

The old-time practice of trying to get better fuel economy by moving the setting to the lean side should not be tried with these chokes. When you change the factory setting this way, it alters the balance between the warmup mixture and engine needs for smooth power. This means that you can cause stalling or sluggish engine operation if you move the setting to the lean side for any reason.

In service, the choke coil unit is practically trouble-free and seldom needs attention. If the unit works at all, the original setting will be correct, and should not be changed in an attempt to correct a service problem.

WHY THEY'RE THERE

Some technicians get the mistaken idea that the "L" and "R" markings on the choke coil bracket are to be used for service adjustment. Actually, these markings are intended only for setting the unit at the factory, where precision calibration equipment is available . . . it's actually one less thing for you to worry about! The only time you should think about resetting a choke coil is when you find one *not* set to specifications, or a service bulletin calls for a new setting.

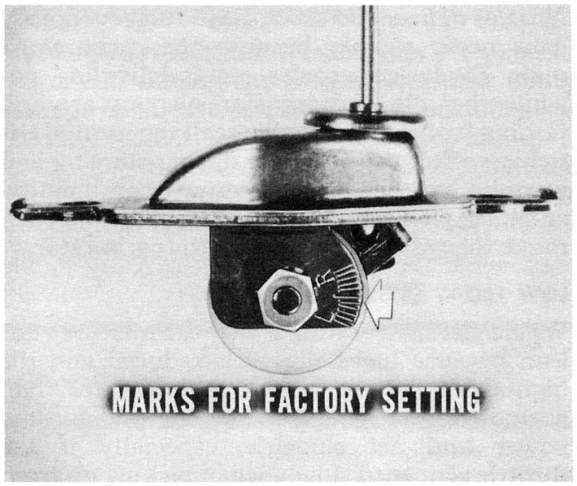
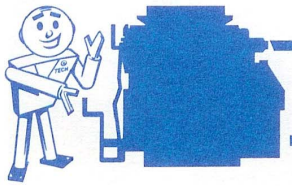


Fig. 15—Choke unit is pre-set

WATCH THE NUMBER

Some of our choke units are look-alikes and one can be easily mistaken for another unless you check part numbers. Because the thermostatic coils are precisely calibrated for specific applications, it's important to be sure the choke unit you install is the right one for the job. And whatever you do, don't try to "get by" with a substitute.



FLOAT SETTING

While not part of the carburetor linkage adjustments, the float setting affects the operation of all the carburetor systems so it deserves special attention. Whether high or low, if the float isn't set to specifications, you'll probably be faced with engine performance problems.

HIGH FLOAT SETTING IS RICH

A high setting can make the engine hard to start, hot or cold, because the rich mixture may flood the manifold with liquid gasoline.

This rich mixture also wastes plenty of gas, especially when the car is driven mostly in city traffic, at low or intermediate speeds. In some cases, the engine may load up or stall, and be very difficult to restart. Idle mixture settings can also be tricky, if not impossible to adjust.

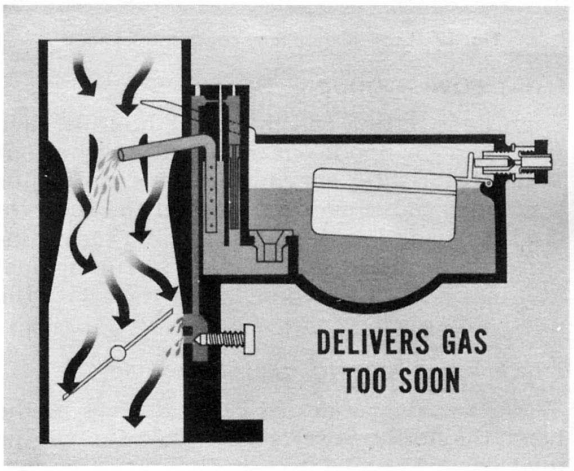


Fig. 16—Rich mixture wastes fuel

Nozzles deliver too soon: High fuel level problems occur mainly because the carburetor's main discharge nozzles start delivering gas while the idle and transfer systems are still feeding fuel. And, if you'll recall the normal enriching effect of the choke during starting and warmup, you can easily see how a combination of choke action and high fuel level can literally make the gas "pour" through the carburetor.

LOW FLOAT SETTING IS LEAN

Where the float setting's low, the mixture runs lean because fuel delivery is reduced and the high-speed system begins to feed later than normal. This means that the engine may lose power and act sluggish, especially if the throttle is opened slowly when picking up from low speeds. Low fuel level is also a common cause of stumble on normal acceleration, and may, in some cases, produce spark knock. Cold-starting problems get in the act, too, mostly when low temperatures make cranking too slow to provide a good starting mixture.

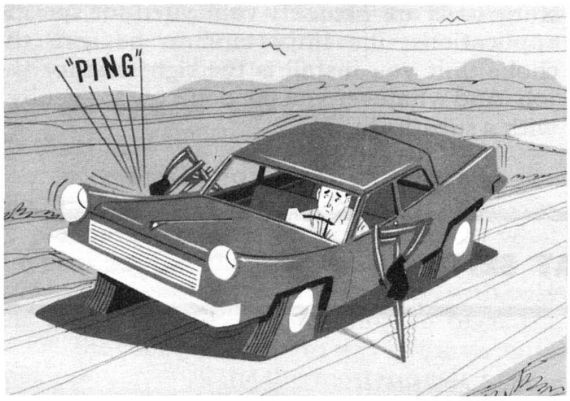


Fig. 17—Lean mixture may cause spark knock

FLOAT BOWL FLOODING

High float setting can make the mixture rich, but when gas floods out of the carburetor float bowl, you'll find the inlet valve's cocked or held open by foreign material in the fuel. On dual-float models, it's also possible for an incorrectly adjusted float section to rub against the float bowl wall where it can stick with the inlet valve open.

CHECK FLOAT SETTING CAREFULLY

When the float rides at normal level in the bowl, the float lip exerts a light pressure on the inlet valve to make it seal properly. However, since the synthetic rubber inlet valve tip can be compressed beyond this point, it is possible to get a false float setting if the valve tip is distorted when the check is made.

TURN IT OVER FOR CHECKING

In most of our carburetors, the setting is bench checked with the float bowl inverted. This allows the float to hang down and apply its weight against the inlet valve so that the valve tip will be compressed the exact amount needed for an accurate float setting check.

USE THE LIGHT TOUCH FOR ADJUSTMENT

When the inlet valve is compressed, it returns to its original shape slowly. This means you'll have to be careful not to put extra pressure on the valve when you check or adjust the float setting. If the tip is distorted in the adjustment, the float setting will be too low when the tip material returns to normal shape.

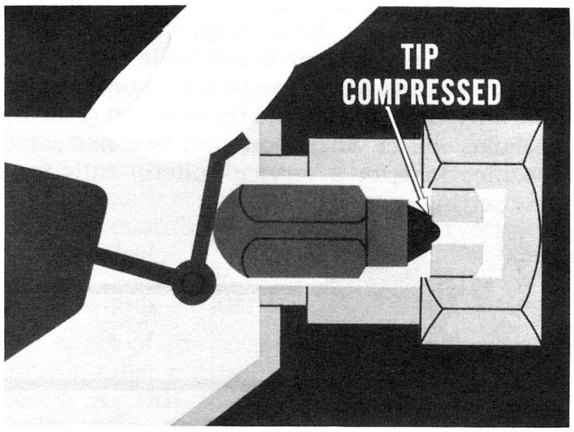


Fig. 18—Pressure gives false float setting

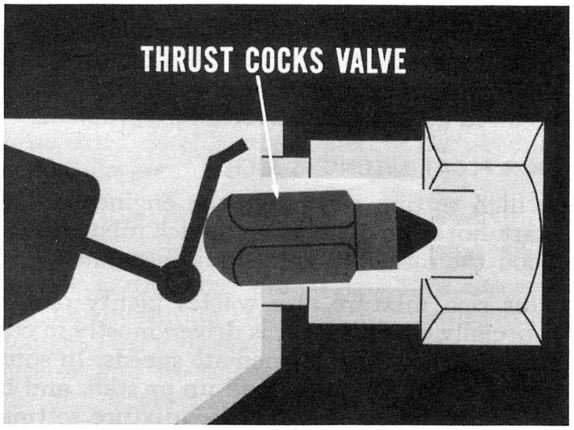


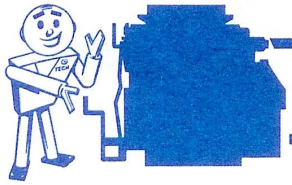
Fig. 19—Off-center pressure jams valve

SET IT RIGHT

When the adjustment is completed, the float lip and inlet valve must be within 10 degrees of a right angle so the valve can move freely in its seat. If the lip is bent beyond this limit, it will put angular thrust on the inlet valve when float pressure closes the valve. This off-center pressure can jam the valve in its seat, or may cause wear that will change the float setting.

WHAT'S THE MODEL NUMBER?

When you reassemble a carburetor after checking float setting, or a complete tear-down, always be sure to re-attach the model identification tag. While this tag may seem unimportant, just remember that the next technician who works on the carburetor will also need the model number so he can apply the correct adjustment specifications.



IDLE AND LOW-SPEED SYSTEMS

When you covered idle- and low-speed systems in the fundamentals, the relationship between throttle valves and idle ports was explained in detail. You know, for example, that the effect of throttle valves is most critical at idle and low speeds . . . that only a small change in throttle opening determines how and when these systems operate.

THROTTLE VALVE ALIGNMENT

Because throttle valves must open and close in a very precise manner, you should always check the valve alignment when the carburetor is off the engine. This check is specially important where you have an unexplained low-speed, light throttle performance problem or it is difficult to get the engine to idle smoothly.

If a valve is accidentally knocked out of line or is damaged in any way, it can jam against the throttle bore and stay partly open even when the curb-idle speed adjusting screw is backed away from its stop. This condition not only upsets the valve idle port register, but also throws off adjustments and settings which are normally made with throttle valves completely closed.

ALIGNMENT CHECKING

Checking throttle valve alignment is easy. Just back out the curb-idle speed adjusting screw and close the throttle tight. Then hold the carburetor or throttle body up to the light and sight into the throttle bores.

If light shows evenly around the valve you are checking, its alignment is okay. Where you can see more light on one side than on the other, the valve will not close properly and must be realigned to operate correctly.

VALVE ALIGNMENT

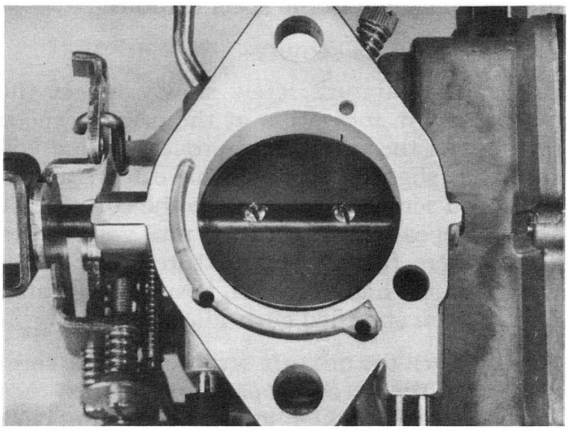


Fig. 20—Misalignment keeps valve partly open

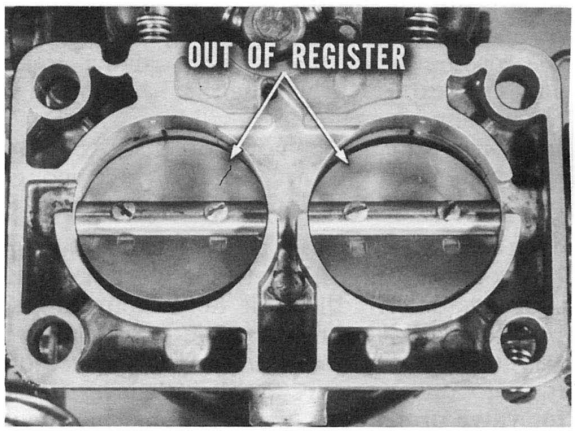


Fig. 21—Valve variation affects idle balance

To realign a throttle valve you'll have to loosen the screws that hold the valve in the throttle shaft. These screws are staked, so be careful that you don't break them off. Hold the valve closed with your fingers and tap it lightly to center it in the bore. Hold the valve in this position and re-tighten the screws.

Pay special attention to dual valve alignment because both valves must close the same amount to register correctly with the idle ports. If there is any variation between the valves, you will have trouble balancing the idle mixture adjustment.

STAY ON THE RIGHT SIDE

You'll seldom have to remove throttle valves or a throttle shaft for routine carburetor servicing. But if you do, mark each valve to show its position on the shaft so you'll be able to re-install it correctly.

It's important to replace throttle valves in their original positions in all carburetors, especially in the two- and four-barrel models. If you get the valves in the wrong bores, turn them upside down, or reverse them 180 degrees, it'll upset the low-speed system's calibration.

In checking throttle valve alignment, don't overlook the secondary valves in four-barrel models. If the secondaries are not aligned and properly adjusted, air flow will "leak" past the valves at low speeds and cause rough idle. In some cases, the engine may stall repeatedly, or not run at all when set at proper idling speed. The lean mixture will also have a bad effect on light-throttle operation.

HANDLE WITH CARE

Practically all throttle valve misalignment or damage results from carelessness in handling the carburetor when it's off the engine. Valve edges are exposed when the throttle is open, so there's always a chance they'll bump against a hard surface if they're not protected. Actually, it takes only a light tap to shift a valve enough to cause trouble, so don't take any chances.

You can guard against throttle valve damage by mounting the carburetor on a set of extension legs or an adjustable holding fixture, so that the valves are raised off the work surface. If you're storing a carburetor for any reason, it's a good idea to wire the throttle lever closed for valve protection. A stout rubber band will also do a good holding job.

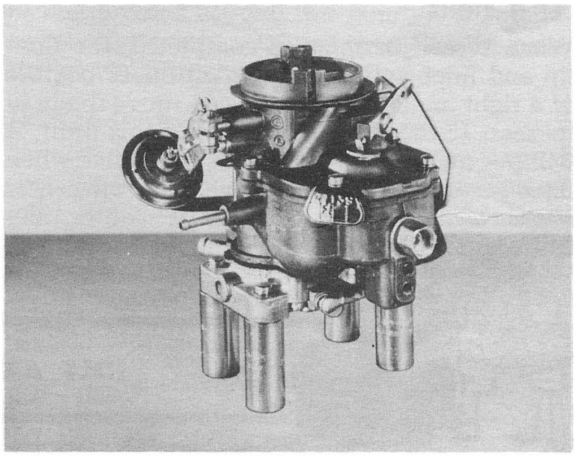


Fig. 22—Legs protect throttle valves

IDLE ADJUSTMENT POINTERS

Adjusting idle speed and mixture is usually the final touch in any carburetor service job. And it's a very important step because it affects the things a customer notices first—smooth idling and light-throttle performance. Fuel consumption is also affected.

FOLLOW SERVICE INSTRUCTIONS

Your service manuals cover idle adjustment procedures in detail for each carburetor model. However, a few general pointers may help to give you a better understanding of what the adjustments do.

Assume that all conditions specified in the service manual for idle mixture adjustment have been set up. Then, with the idle mixture screw at its preliminary setting (about one turn open), set the idle speed screw to get the idle speed shown in the specifications.

CHANGE SETTINGS SLOWLY

Adjust the mixture screw slowly to get the highest r.p.m. indication at the original speed setting. As the mixture improves, engine will speed up slightly, so you'll have to re-adjust the speed screw to get back to the correct idle speed. Repeat this procedure until you reach a point where turning the mixture screw either way from the highest r.p.m. position will cause a drop from specified curb-idle speed.

Finally, turn the mixture screw clockwise carefully until the speed drops slightly. Then turn it back out just enough to bring the r.p.m. back to correct speed.

BALANCE DUAL SETTINGS

Idle adjustment on two- and four-barrel carburetors follows a similar pattern except that two mixture screws are involved. Here you must balance both sides of the carburetor.

If you must open or close one mixture screw much more than the other for the best r.p.m. indication, it means that the idle system isn't working properly. Where this occurs, check the mixture screws for grooves or other damage. Also make sure the idle ports and passages are not clogged.

ADJUST IDLE TO PREVENT ICING

Carburetor icing is another reason why careful idle adjustment is important. If the mixture is too rich, the added fuel creates a cooling effect which will form a clogging rim of ice along the edge of the throttle blade, especially in cool, damp weather.

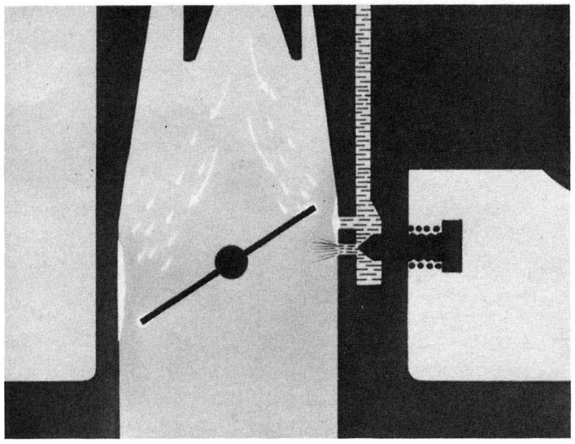


Fig. 23—Rich idle mixture causes icing

You can cut down icing stalls by adjusting idle speed to the high limit and idle mixture on the lean side. A higher idle speed setting opens the throttle wider to make it less critical to ice clogging . . . a leaner mixture reduces the cooling effect.

MANIFOLD HEAT CONTROL VALVE

Another critical factor in carburetor icing and overall engine performance is the operation of the manifold heat control valve. If the valve sticks open, the manifold is bypassed and warms up more slowly. This not only prolongs the conditions that produce icing, but can make the problem worse by delaying choke opening.

At the other extreme, if the valve sticks closed, the carburetor may overheat and then you'll have stalling and hot-start problems.

USE PREVENTIVE MAINTENANCE

It's good practice to check the manifold heat control valve of any car you work on. A few drops of Mopar Manifold Heat Control Valve Solvent can head off many a performance or carburetor problem before it starts.

CHECK THE CRANKCASE VENTILATOR VALVE

The final ingredient in a good idle adjustment is a checkout of the crankcase ventilator valve. This valve, as you know, provides a controlled vacuum bleed to produce positive crankcase ventilation.

If the valve clogs or sticks closed, the air which normally bleeds into the manifold is shut off and the mixture turns rich. This, in turn, causes a rough idle.

Where the valve sticks open, too much air is admitted to the manifold, and the mixture turns lean. This excess air also causes idle mixture problems and affects low-speed performance as well.

USE THE RIGHT VALVE

If you find the ventilator valve clogged or sticky, simply replace it and re-adjust the idle. Make sure you install the correct valve because the two types used have different orifice sizes. Valves for 170-cubic-inch engines have a bright-finished end washer . . . all others have a black washer.

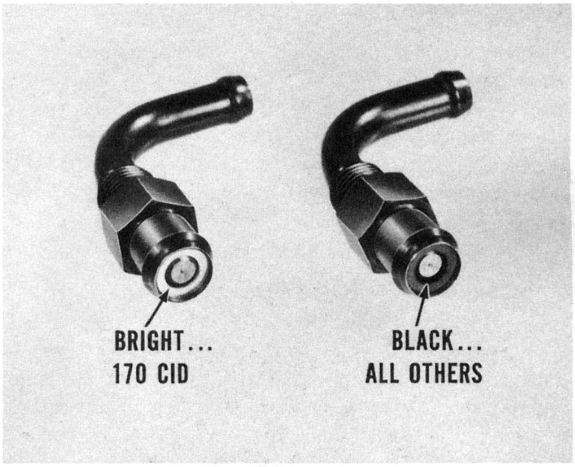


Fig. 24—Service PCV valves by replacement

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