

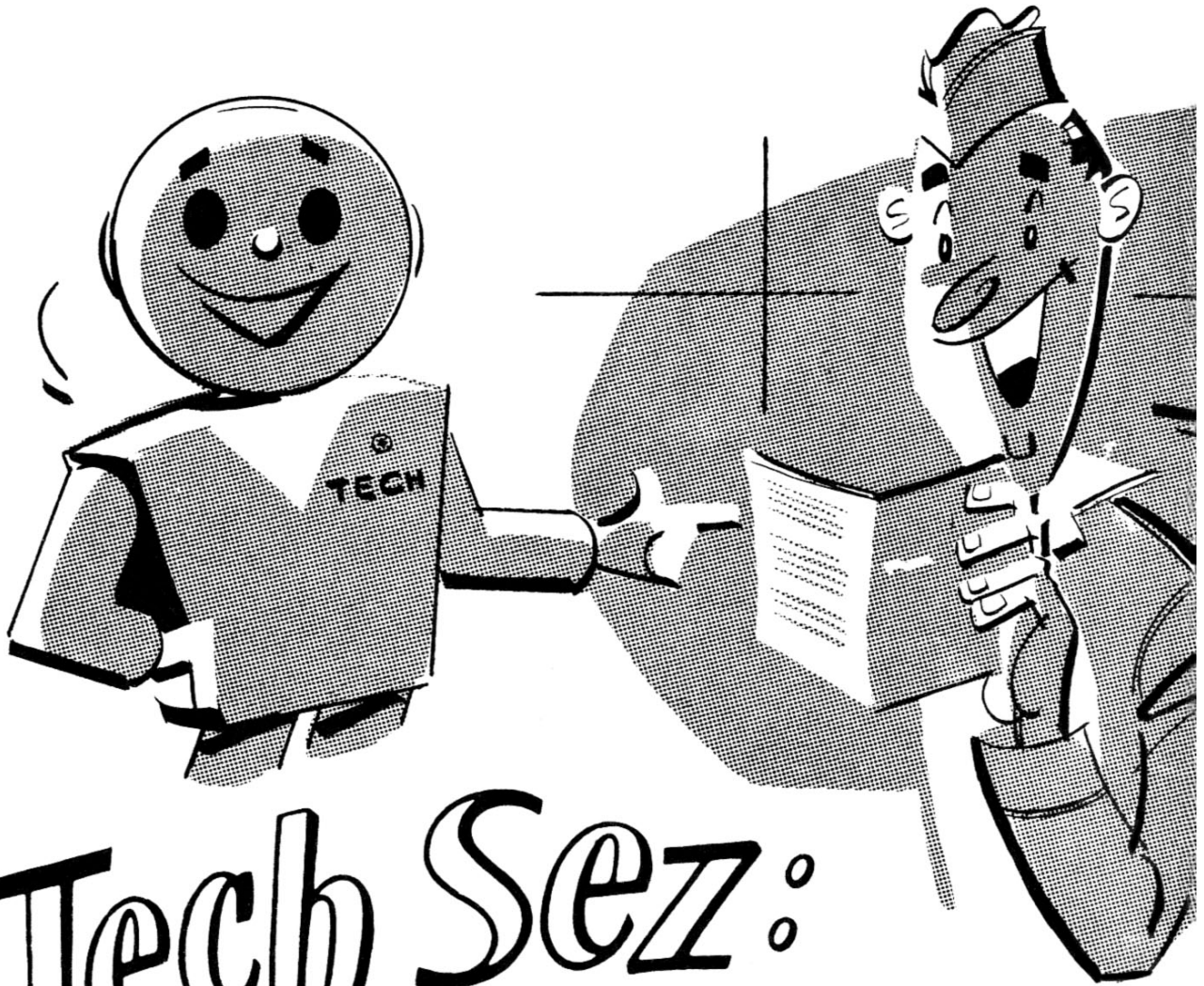
SERVICE REFERENCE BOOK

AUTOMATIC CHOKE AND HEAT CONTROL VALVE



Prepared by
CHRYSLER CORPORATION
PLYMOUTH • DODGE • DE SOTO
AND CHRYSLER DIVISIONS
SESSION NO. 82

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Tech Sez:

TIME TO BRUSH UP ON AUTOMATIC CHOKES

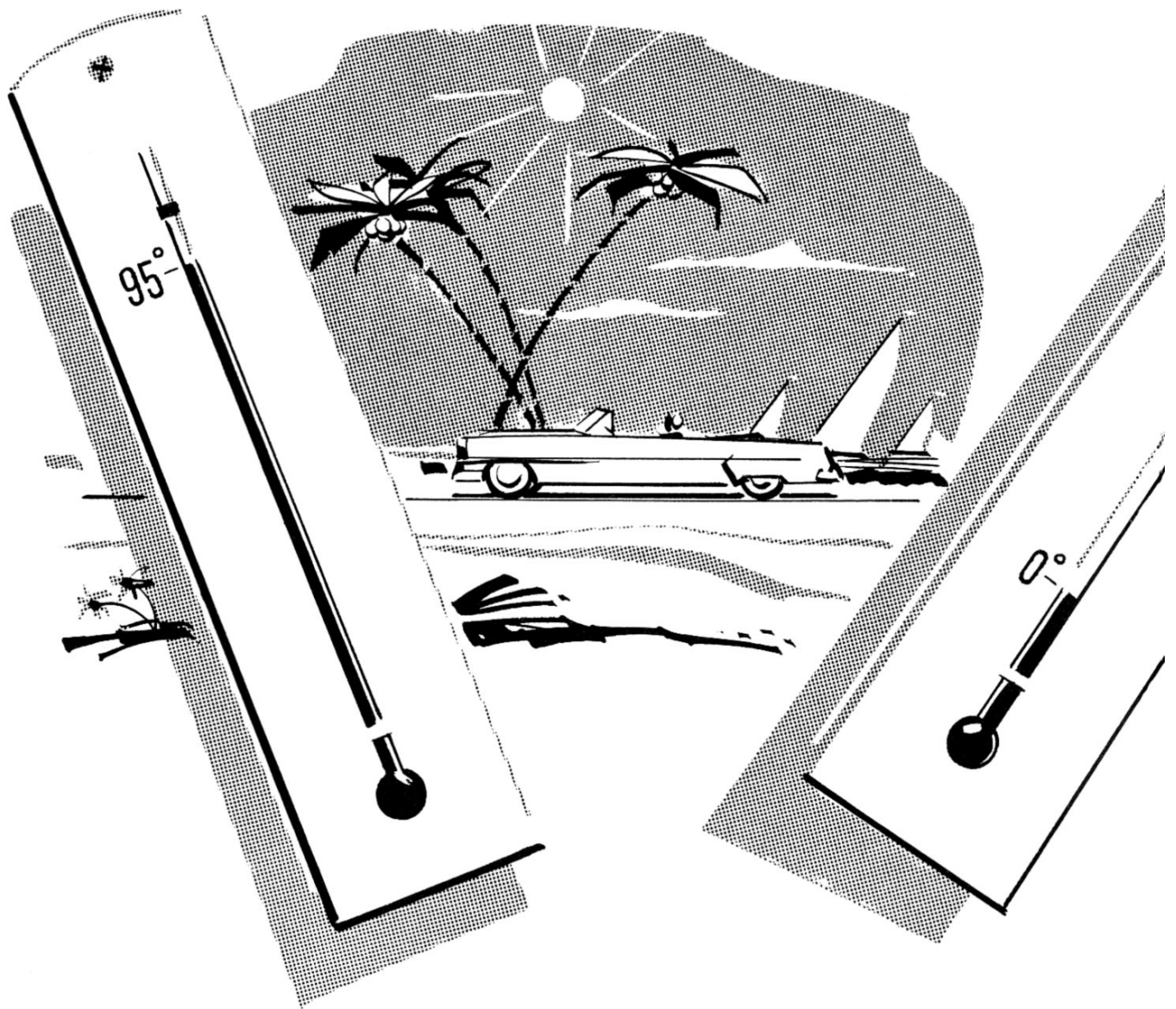
This Reference Book is brim full of information you can put to good use all year 'round. Easy starting, in hot or cold weather, is something every owner wants. And, he wants economic operation, too. You'll be able to give him that kind of performance if you know how the automatic choke works, and what to do about it if the choke doesn't work as it should.

Many mechanics are apt to forget the importance of the manifold heat control valve in its relation to economy of operation. Don't let yourself be caught in that group.



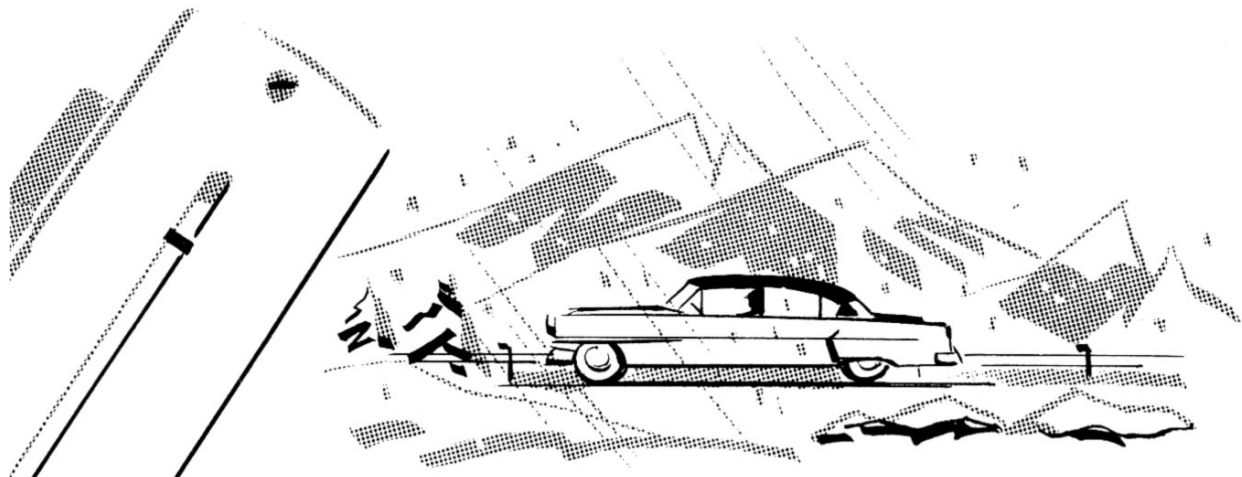
Here's how the information on these two important units is arranged in this book:

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IMPORTANCE OF PROPER OPERATION

The engine fuel system is governed by two important units which are affected by heat and spring pressure. The integral type automatic choke is one of those units, and has a direct relation to the fuel-air mixture during starting and the warm-up period. The manifold heat control valve is the other unit, and has a lot to do with economy and performance. Therefore, it is important that every mechanic have a thorough understanding of each of these units.

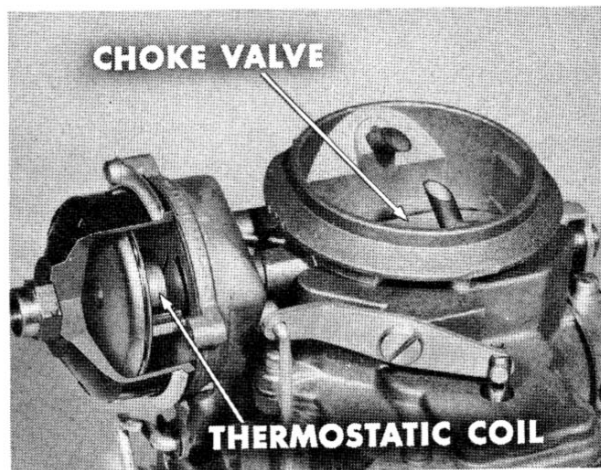


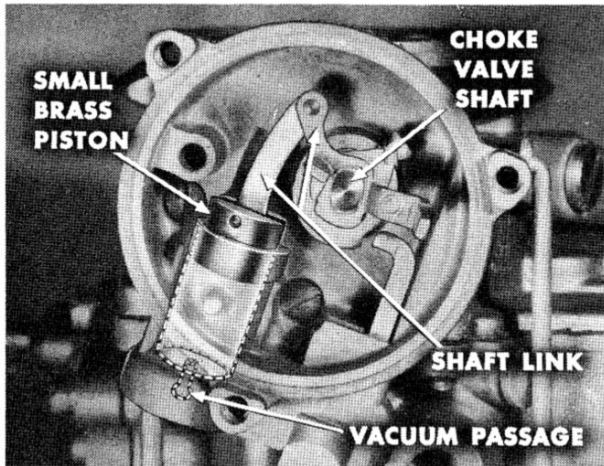
OPERATION OF THE INTEGRAL TYPE AUTOMATIC CHOKE

Suppose we begin with a cold engine, and show you how the automatic choke works during the few minutes after starting.



You'll remember that the choke valve is held closed by the thermostatic coil. As soon as the engine starts, manifold vacuum starts to open the choke valve. But it can only open it a little, because the thermostatic coil is trying to hold the valve closed.

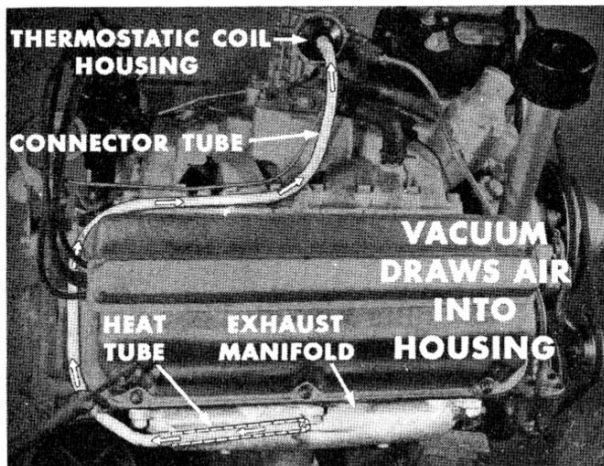




There's a small brass piston in the automatic choke, connected to the choke valve shaft through the shaft link. This piston is operated by manifold vacuum, through an opening in the bottom of the cylinder.

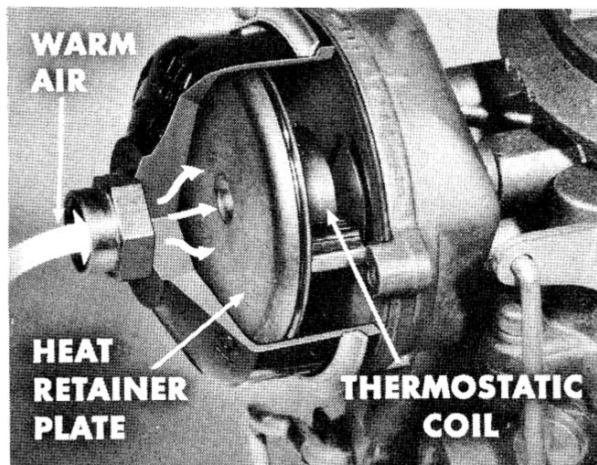


The vacuum tries to pull the piston into the cylinder, and open the choke valve. But the thermostatic coil resists the vacuum pull.

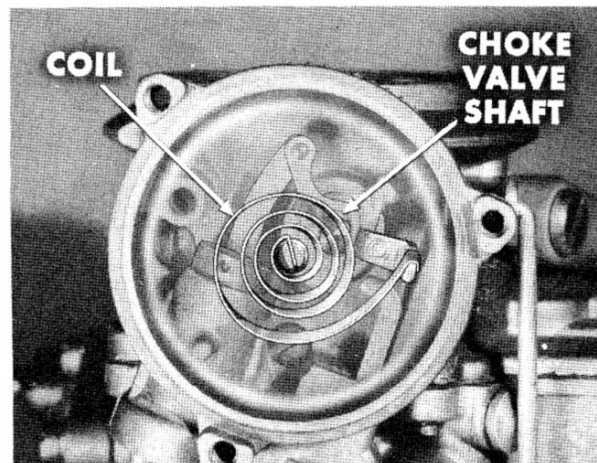


However, the vacuum also starts to draw air into the thermostatic coil housing through the connector tube which runs from the heat tube in the exhaust manifold to the housing. The air is heated in the manifold heat tube, and passes up the connector tube and into the housing.

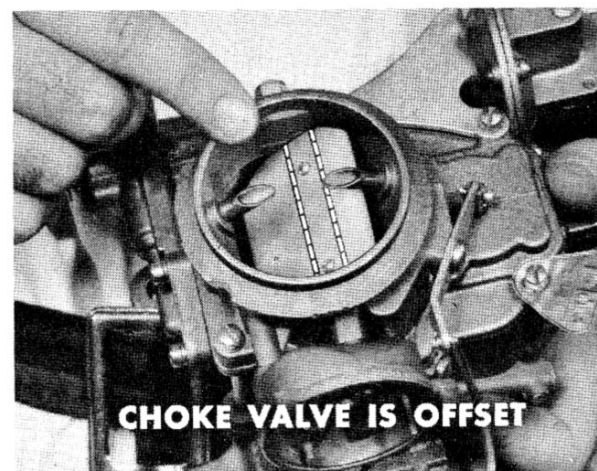
As this warm air enters the housing it is directed against the heat retainer plate. The thermostatic coil is connected to the plate, so it, too, becomes warm.



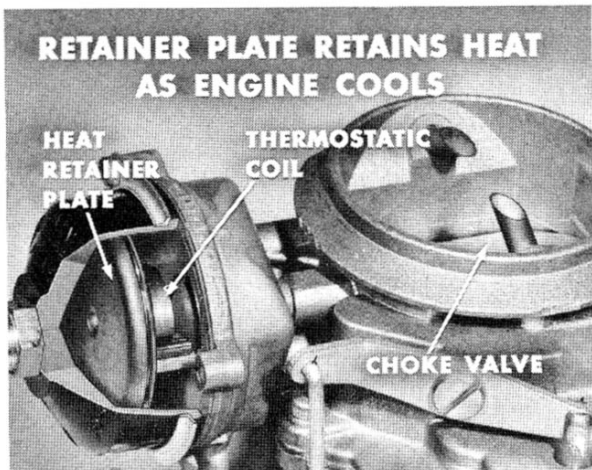
As the coil becomes warm it gradually loses its strength, relieving tension on the choke valve shaft. The vacuum, then, overcomes the thermostatic coil tension, and gradually opens the choke valve.



This gradual opening of the choke valve, controlled by the thermostatic coil, is what regulates the fuel-air mixture during the warm-up period. At the same time, air rushes through the carburetor to help position the choke valve. The choke valve is offset on the shaft, so



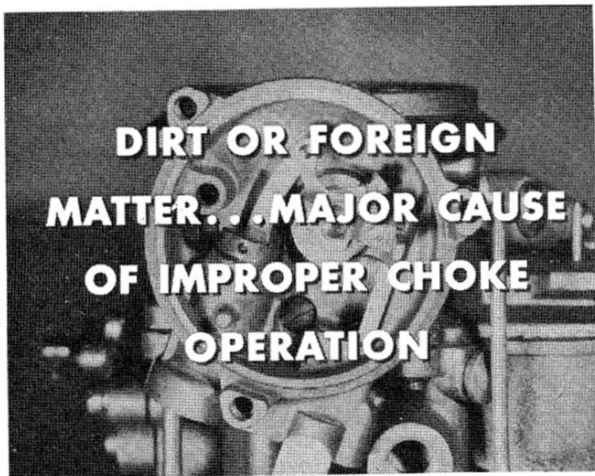
the incoming air tends to force the valve open against the tension of the thermostatic coil. The result is the proper positioning of the choke valve, according to engine speed and load conditions.



As the engine is cooling off, heat is retained by the heat retainer plate so that the thermostatic coil doesn't cool off too fast and close the choke valve while the engine is still hot. This action prevents overchoking when starting a *warm* engine.



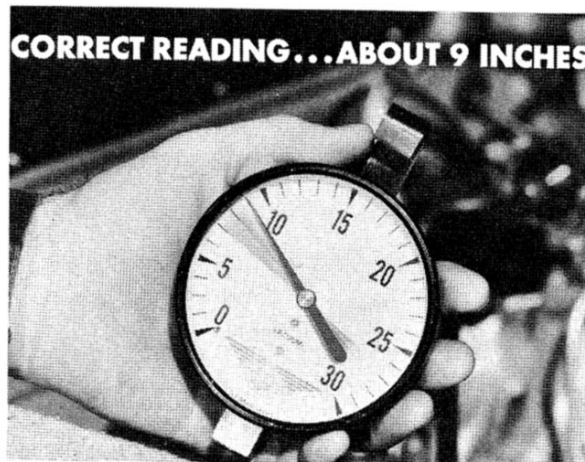
SERVICING THE AUTOMATIC CHOKE



Dirt or foreign matter in the choke mechanism is the major cause of improper operation. Anything that affects the manifold vacuum pull on the brass piston will foul up the operation, too.

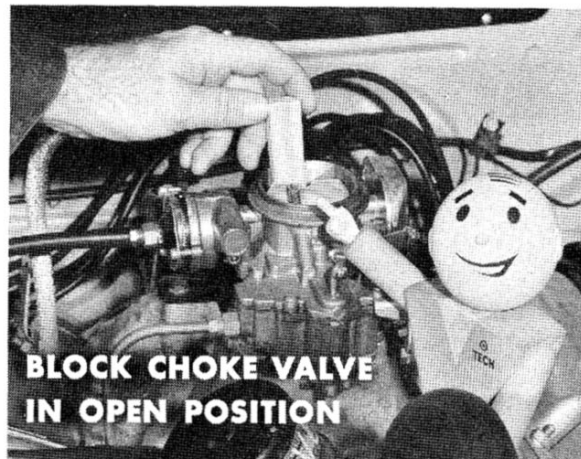
Vacuum Reading

In order for the choke valve to operate properly, a certain amount of air must be drawn into the heat tube to provide the correct vacuum reading. The correct vacuum reading on current models should be about nine inches at sea level. If it's lower than seven inches, something's wrong. So, it is important to check the amount of vacuum pull through the choke housing when checking choke performance.



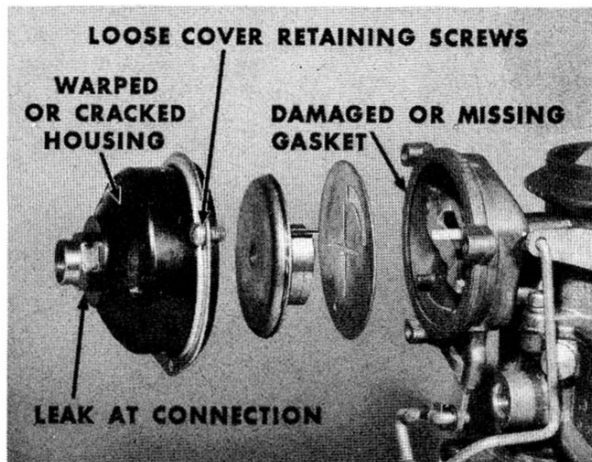
of vacuum pull through the choke housing when checking choke performance.

After connecting the vacuum gauge to the choke housing, block the choke valve in the open position. Then connect the vacuum gauge to the adapter in the choke housing. Start the engine. You'll notice that the engine idle speed will be a little slower than normal, but don't worry about it. That's normal when the gauge is connected.



Loss of Vacuum

Any leaks in the vacuum lines will mean reduced vacuum readings. A low vacuum reading means that not enough air is being drawn into the choke thermostatic coil housing. This will cause a delayed choke valve opening.



Vacuum losses can occur at several places. It could happen at the choke housing, caused by loose cover retaining screws. Or it might happen because there is a warped or cracked housing, or even a damaged or missing gasket. Vacuum loss can also be caused by a loose fitting thermostatic control connection.

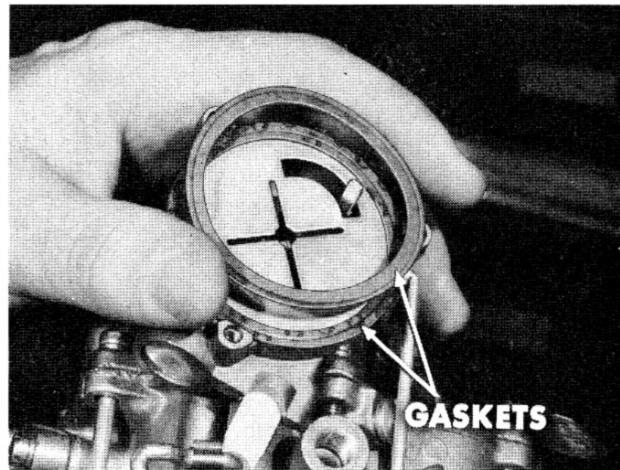


If the housing appears to be in good condition, check it for being warped by trying to rock it on a surface plate, or a pane of glass. Make sure that you remove the heat retainer plate assembly before you make this warp test.

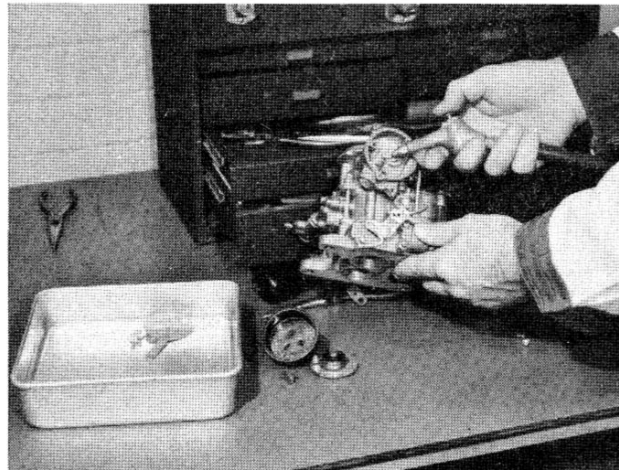


You can remove this heat retainer plate by striking the housing in the palm of your hand.

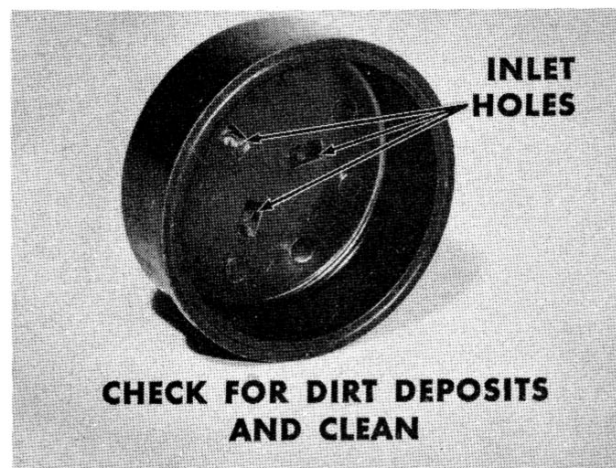
If you find that the warpage is slight you can often leak-proof the housing by using an additional gasket. But if two gaskets don't seal the leak, replace the housing.

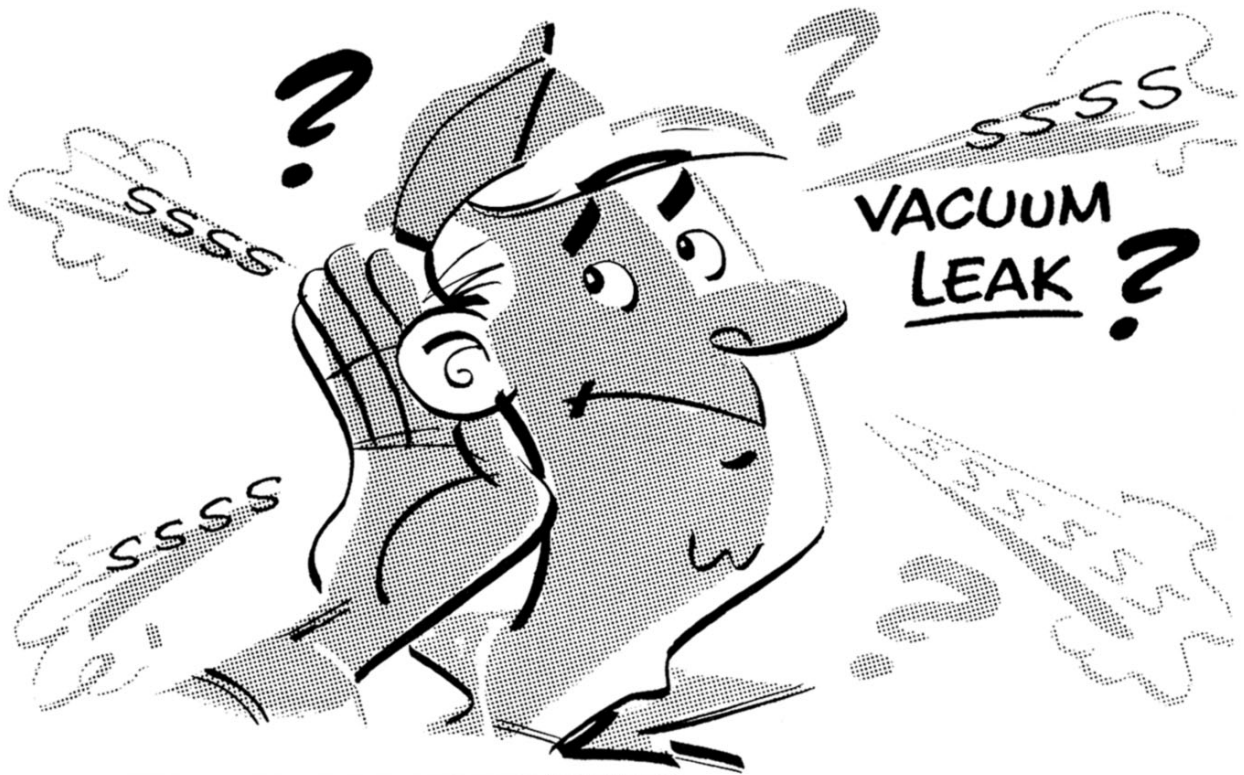


While you've got the choke housing off and the heat plate removed, clean all parts of the choke mechanism with solvent and blow dry. This will clean out all possible points of restriction.

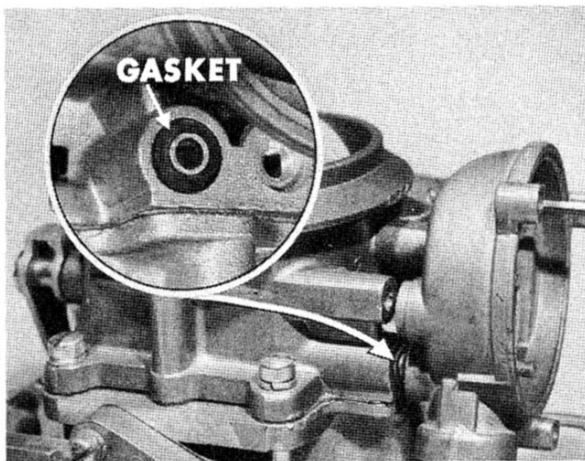


While you have the heat plate out of the housing, check the three inlet holes in the housing for dirt deposits. If there's any dirt present, use a solvent and a small brush to remove it, and blow out the passages with air.



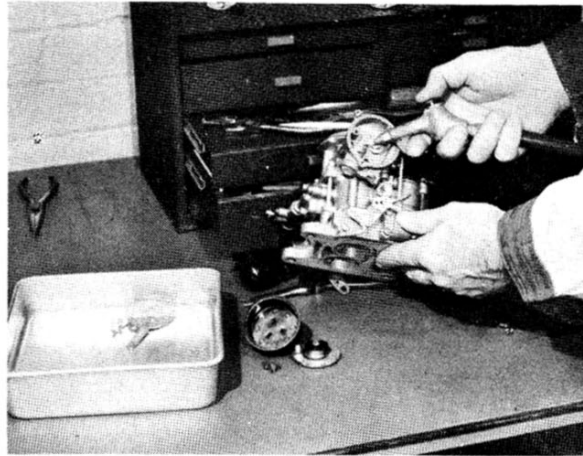


There's one other place where you could get a vacuum leak on carburetors where the metal choke housing is separate from the air horn.

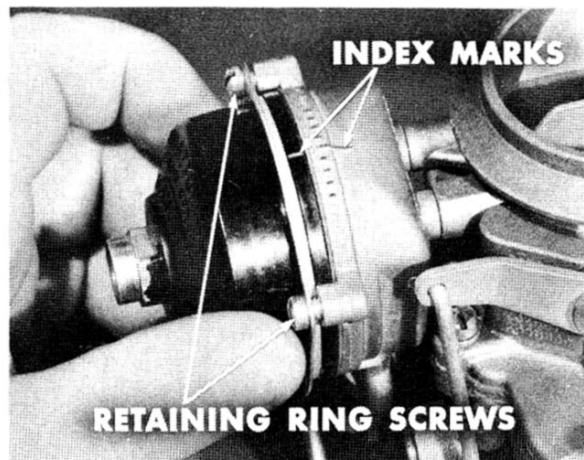


That's in the vacuum passage between the carburetor air horn and the choke housing. There's a small gasket there. You'll have to loosen the choke housing from the air horn to check that gasket.

If the vacuum reading was OK, but the choke still didn't operate right you'd suspect that dirt or dust had gotten into the housing. So take the mechanism apart and clean it.

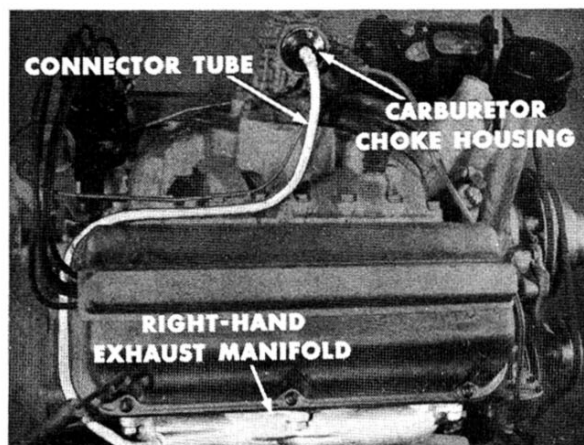


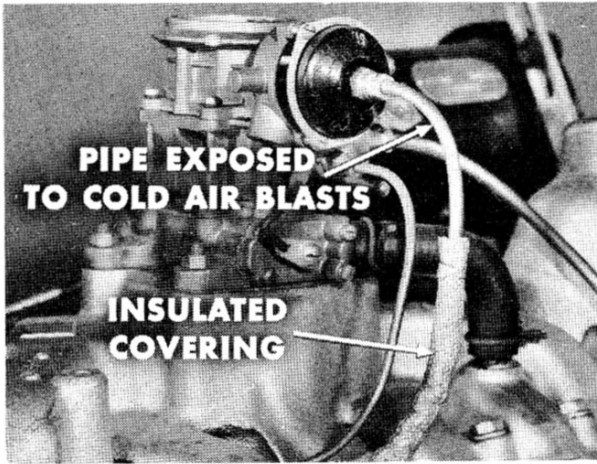
When you've got everything cleaned and reinstalled, install a new housing gasket and replace the baffle plate and housing. Then line up the index marks on the choke housing and air horn, and tighten the retaining ring screws.



Checking the Connector Tube

On current eight-cylinder models there is a connector tube routed from the right-hand exhaust manifold, around the rear of the right-hand bank of cylinders and up to the carburetor choke housing. That's a long tube, so you need insulating material the entire length of the tube, from the manifold to the choke, to retain the heat.

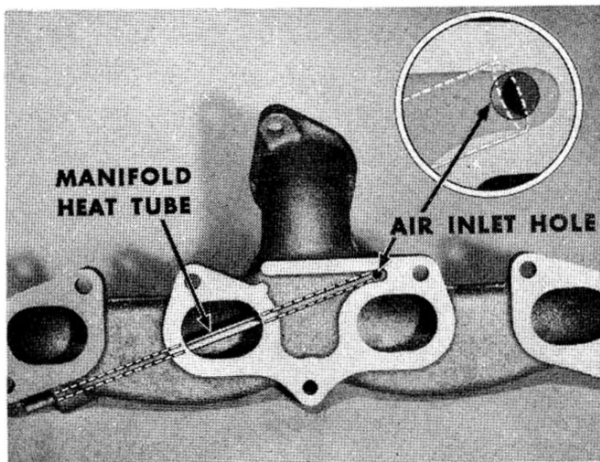




So check this covering. It may have slipped down, leaving the upper end of the pipe exposed to cold air blasts from the fan. That cools the air entering the choke housing and prevents proper choke opening. You may have a case in which the choke operation is perfectly normal while the car

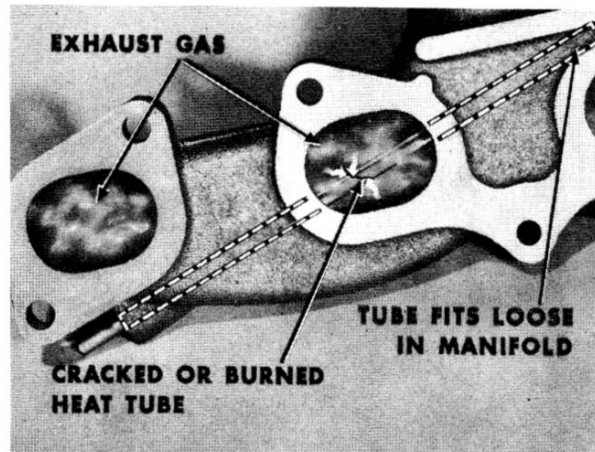
is in the shop. But, when the car is on the road, particularly during cold weather, the choke partially closes and the engine operates on too rich a mixture. In such a case, be sure the connector tube insulation completely covers the tube. You'll probably find that the insulation has slipped out of position, leaving part of the tube uncovered.

The heat tube at the choke housing should be sizzling hot after the engine has reached normal operating temperatures.



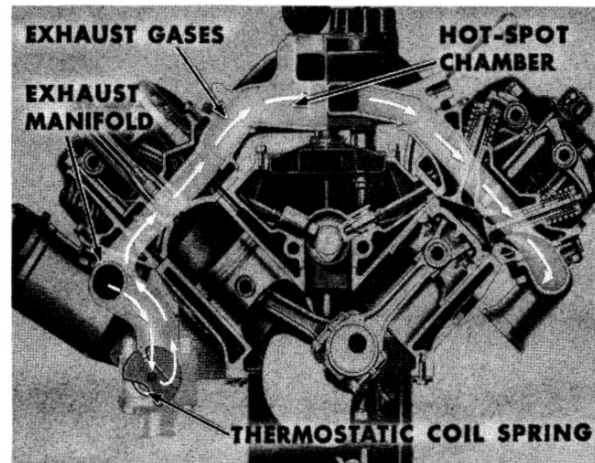
The inner end of the manifold heat tube should be checked to see that it is positioned correctly, so that it is not causing the air inlet hole to be blocked off.

If you have a case where you find carbon or corrosion in the choke mechanism, it may be possible that the heat tube is drawing exhaust gases from the manifold. That means you've got a heat tube that's cracked or burned through, or the tube may be a loose fit in the manifold. If you find these conditions, either replace the tube, or replace the manifold and tube as an assembly.

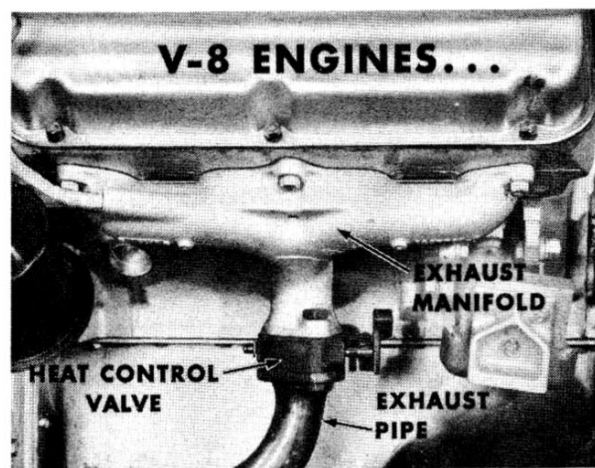


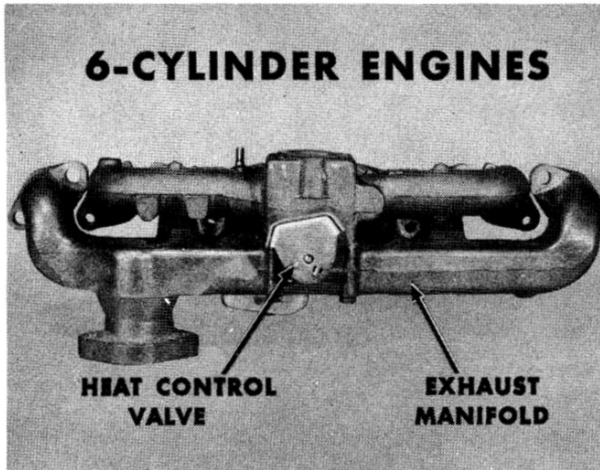
MANIFOLD HEAT CONTROL VALVE

The purpose of the manifold heat control valve is to direct the hot exhaust gas from the exhaust manifold to the hot-spot chamber of the intake manifold, heating that chamber. The valve position is controlled by a thermostatic coil spring, very much like the choke valve coil spring.

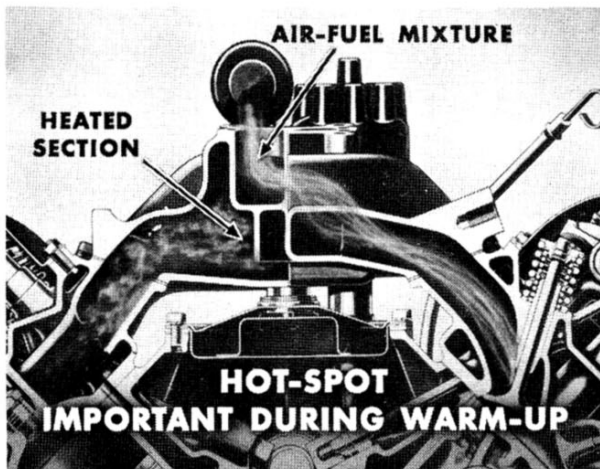


In the V-8 engine the heat control valve is located between the outlet of the right-hand exhaust manifold and the flange of the exhaust pipe.

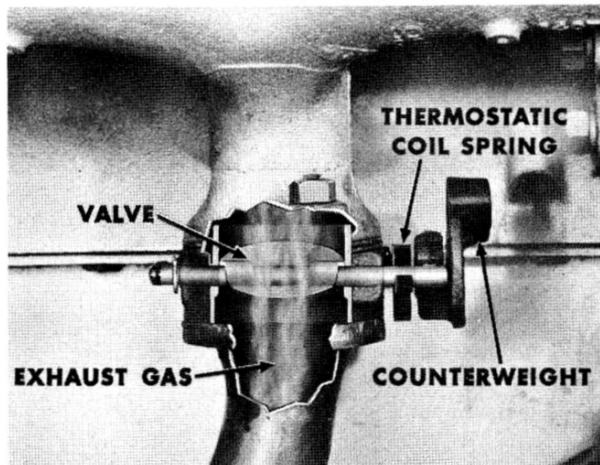




In the six-cylinder engines the heat control valve is mounted in the center of the exhaust manifold.



Directing the hot exhaust gas around the hot-spot chamber of the intake manifold helps to vaporize the fuel-air mixture as it passes through this heated section on its way to the combustion chamber. This is particularly important during warm-up.



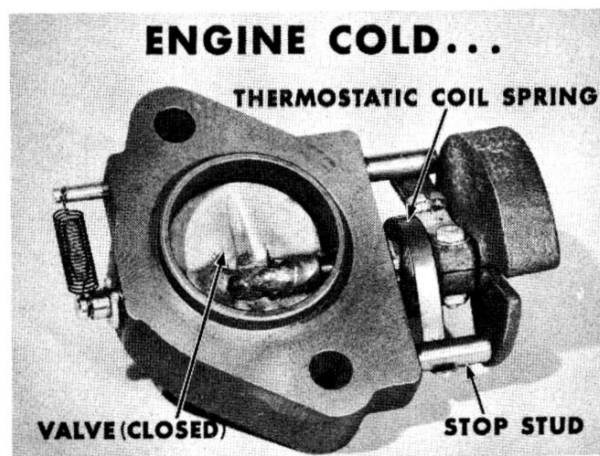
After warm-up, the thermostatic coil spring loses some of its tension. Then the valve is positioned partly by the flow of exhaust gases and partly by the spring and counterweight. The hot exhaust gas is directed to the hot-spot, as required, to maintain proper vaporization

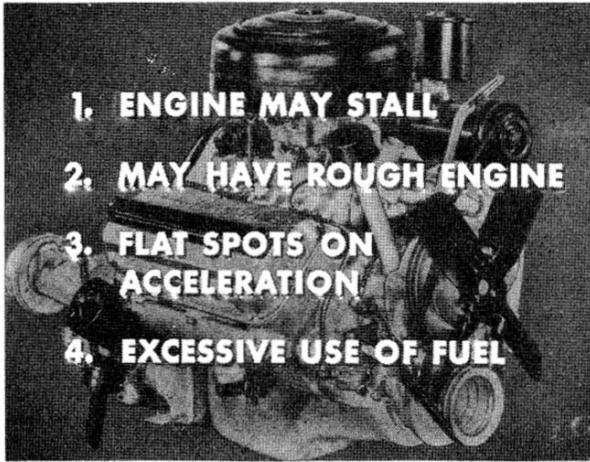
of the mixture. By maintaining proper vaporization of the incoming mixture we get peak performance from the engine, with the best fuel economy.



Servicing the Manifold Heat Control Valve

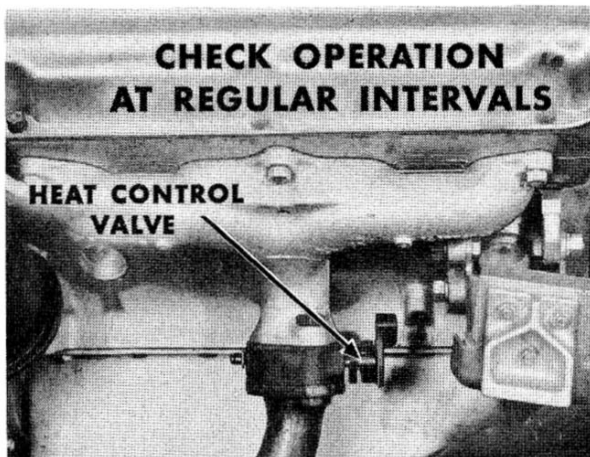
We said that the valve should operate freely at all times. With the engine cold, the thermostatic coil spring should be wrapped around its stop stud and be holding the valve in the *closed* position.





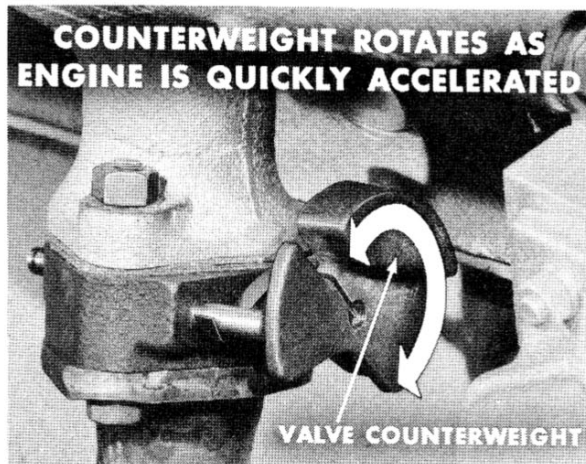
When the exhaust gases are not properly directed to the hot-spot chamber in the intake manifold several conditions may result: The engine may stall. You will have a rough engine. You will have flat spots on acceleration, and the owner will talk about excessive

use of fuel because of the need for wider throttle openings and the constant pumping of the accelerator to keep the engine running.

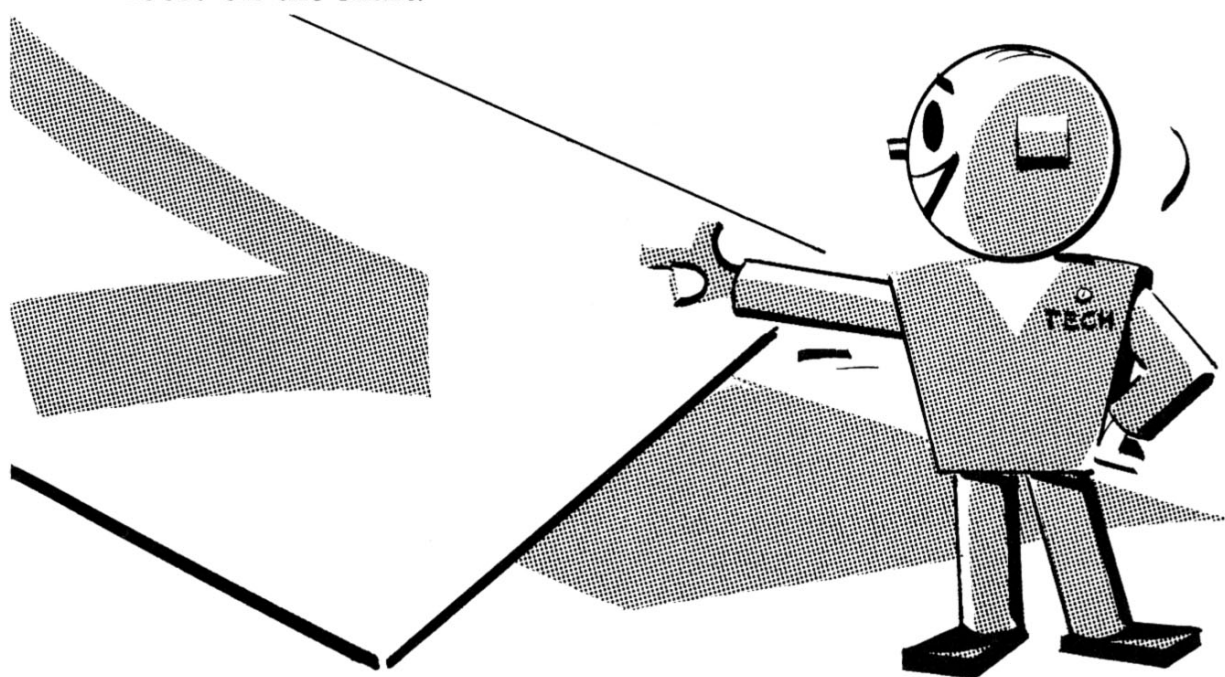
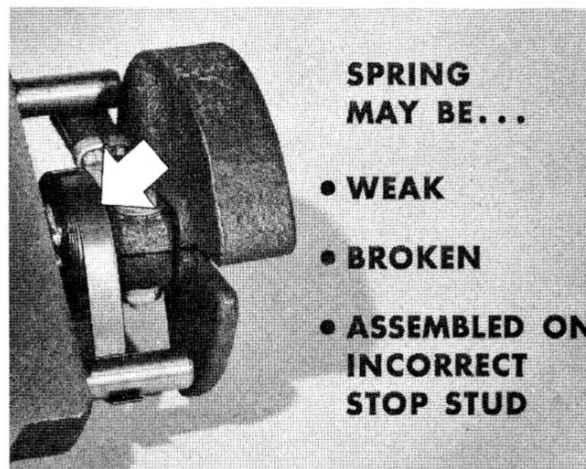


Because the operation of this valve is so important it should be checked at regular intervals. Check it when the car is in for lubrication, and particularly when an engine tune-up is performed.

To check the operation of the manifold heat control valve, first quickly accelerate the engine wide open, then quickly release the throttle. This action should cause the exhaust gases to exert a force on the valve which causes the shaft, with its counterweight, to respond by rotating, then returning to normal position.



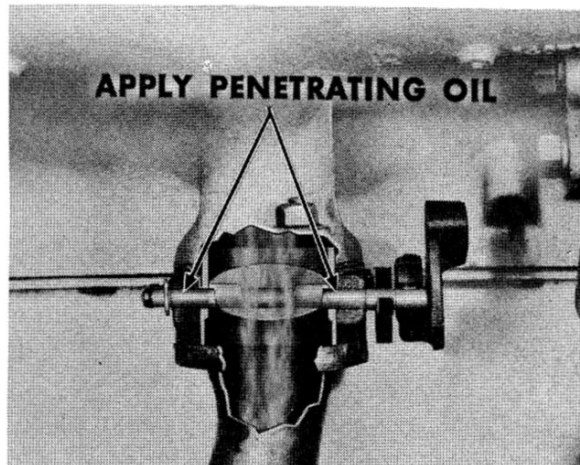
If no movement of the counterweight is noticed you better check to see why. The valve shaft may be frozen in the valve body, the thermostatic coil spring may be weak, broken, or assembled on the incorrect stop stud, or the valve plate may have become loose on the shaft.



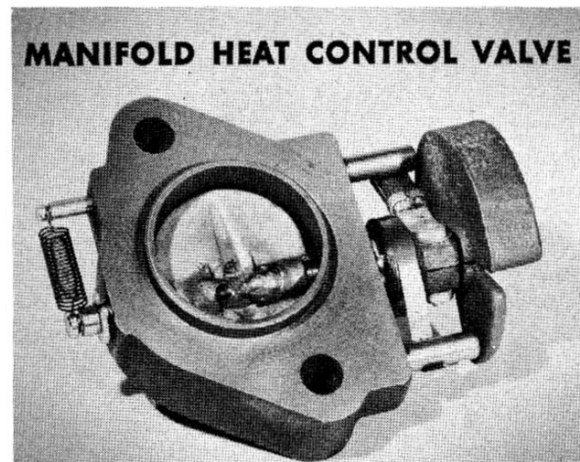


If the valve shaft has frozen in the body, first attempt to free it by applying penetrating oil at the shaft ends, and working the valve by hand.

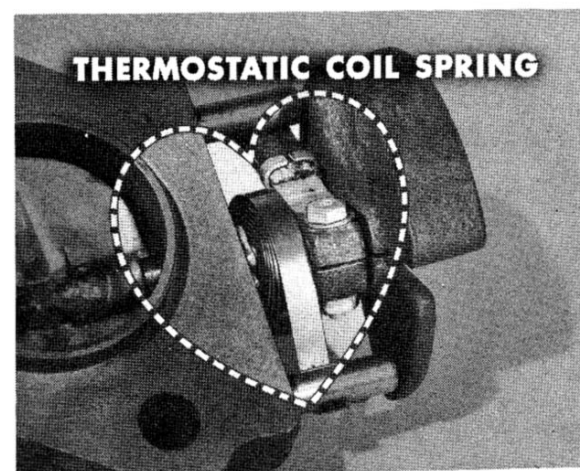
If you get it free, powdered graphite is the best lubricant to *keep* it free.

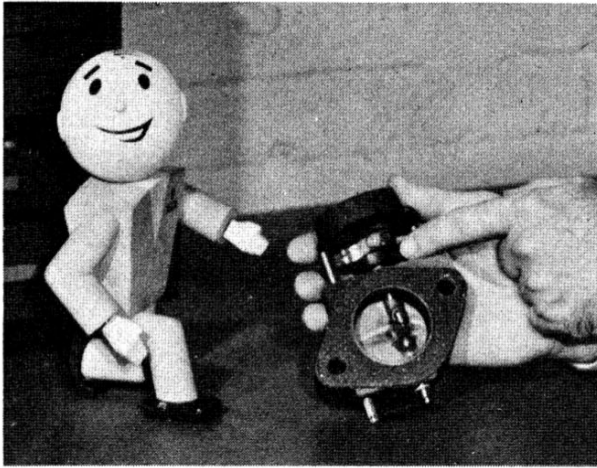


If you can't free up the valve in this way, you may have to remove the valve—or the manifold—from the engine, and work on it at the bench. If you still can't free it up, you'll have to replace the assembly.

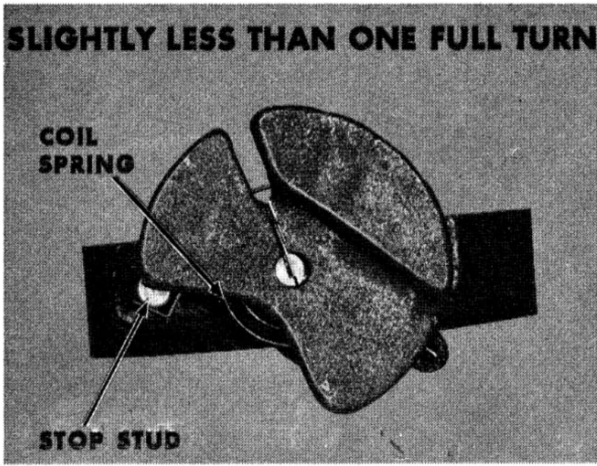


Since the thermostatic coil spring is the heart of the heat control valve, it is important that it be installed correctly. A weak, broken, damaged, or incorrectly assembled coil spring can cause improper operation of the valve.





If the spring is wound too tightly, the valve will not open soon enough. And if the spring is wound too loosely the valve will open too soon. That means you'd be getting too much or too little heat routed to the intake manifold hot-spot.



With the inner end of the coil spring properly anchored in the slot in the outer end of the valve shaft, the coil should be wound so that it has slightly less than one full turn when anchored over the stop stud. That's mighty important. Even as little as one-half turn less or more than specified will affect the operation of the manifold heat control valve.



If you do find excessive wear on the shaft or valve assembly, install a new unit. NOTE: Never, under any circumstance, add extra outside springs to the valve shaft in an attempt to eliminate noise.



**USE THE NEW TECH QUESTIONNAIRE
FOR SESSION NO. 82
WHEN RECORDING YOUR ANSWERS
TO THESE TEN QUESTIONS**

- The thermostatic coil in the automatic choke holds the choke valve closed. RIGHT 1 WRONG
- While the engine is cooling off, heat is retained by the heat retainer plate so the thermostatic coil doesn't cool off too fast. RIGHT 2 WRONG
- The correct choke vacuum reading on current models should be about nine inches at sea level. RIGHT 3 WRONG
- Vacuum readings are taken at the choke housing. RIGHT 4 WRONG
- A low vacuum reading means that too much warm air is being drawn into the choke thermostatic coil housing. RIGHT 5 WRONG
- If two gaskets don't correct choke housing warpage, replace the housing. RIGHT 6 WRONG
- The heat tube at the choke housing should be sizzling hot after the engine has reached normal operating temperatures. RIGHT 7 WRONG
- The purpose of the manifold heat control valve is to direct hot exhaust gas from the exhaust manifold to the hot-spot chamber of the intake manifold. RIGHT 8 WRONG
- Powdered graphite should be used to keep the heat control valve shaft free. RIGHT 9 WRONG
- The coil spring in the heat control valve mechanism should have less than one full turn when anchored over the stop stud. RIGHT 10 WRONG

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