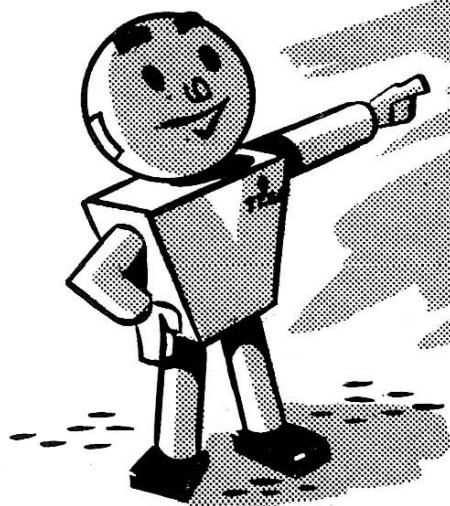
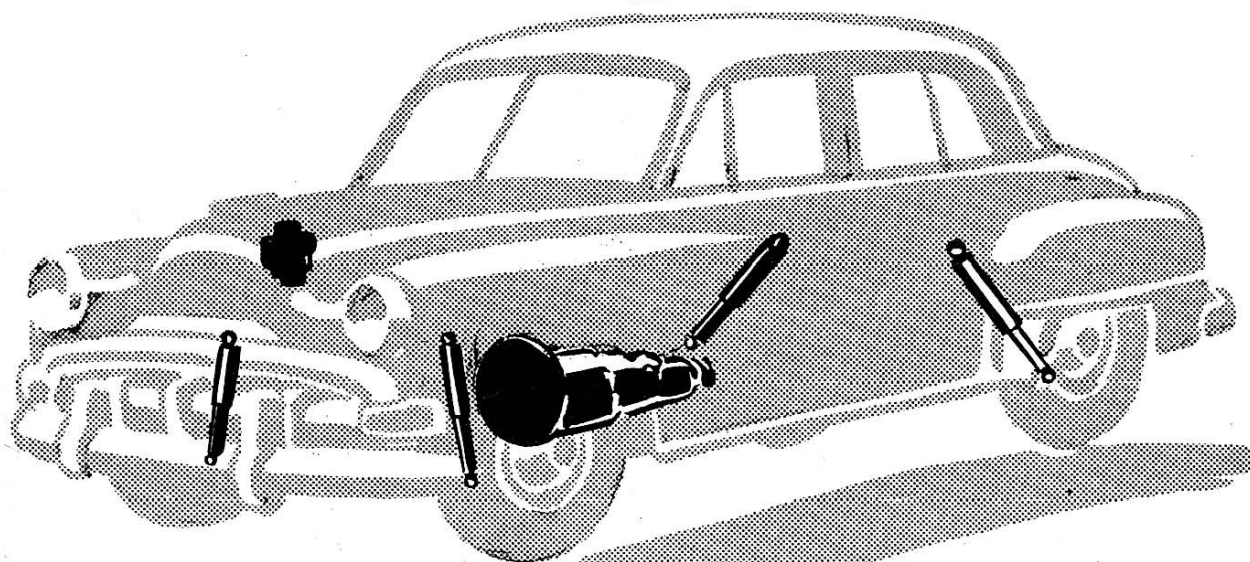


**SERVICE REFERENCE BOOK**

# **A CLOSE LOOK AT THE 51's**



*Prepared by*  
**CHRYSLER CORPORATION**  
**PLYMOUTH, DODGE, DE SOTO**  
**AND CHRYSLER DIVISIONS**  
**Vol. 4**                      **No. 3**

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# TECH SEZ: THERE'S DOLLARS IN KNOW-HOW!



Did you ever notice that, in most cases, it's the boys with the knowledge—the old know-how—that seem to go places in any business? I guess that every man that's worth being called a me-

chanic wants to get all the inside information he can get that'll help him in his job. When you tell a good mechanic that "something new's been added" he wants to know **WHAT** it is, **HOW** it works, **WHY** it's been added, and **WHEN** he can get all the dope on it!

Take these new Oriflow shock absorbers as an example. We've all heard about them. Most of us have ridden in the '51 models equipped with them. This month we're gonna pull the wraps off the new Oriflow shocks and several more of the '51 features. So, drag up a chair and I'll let you in on what's new in '51. Below are the new-car features we're coverin' this month. Next month we're givin' you another film jam-packed with more '51 features.

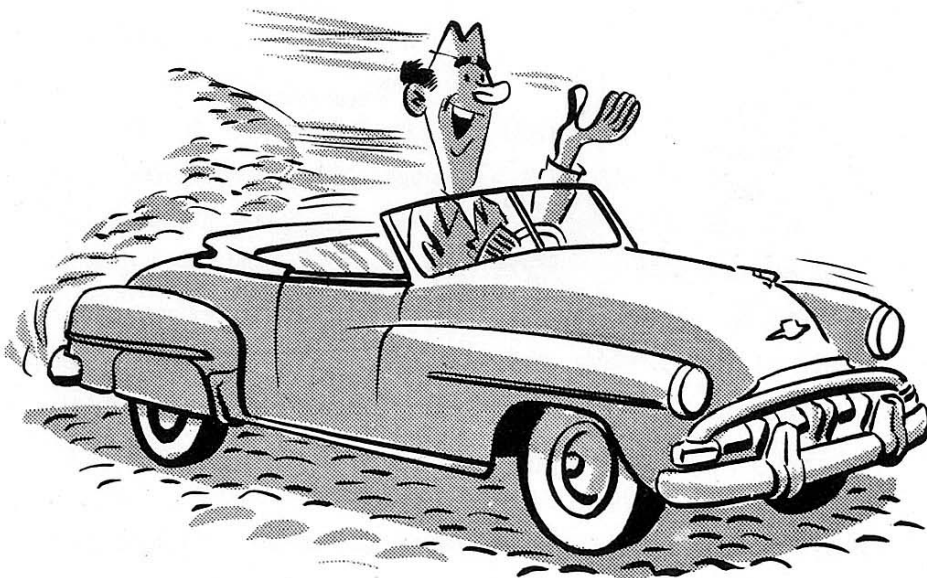
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# ORIFLOW SHOCK ABSORBERS

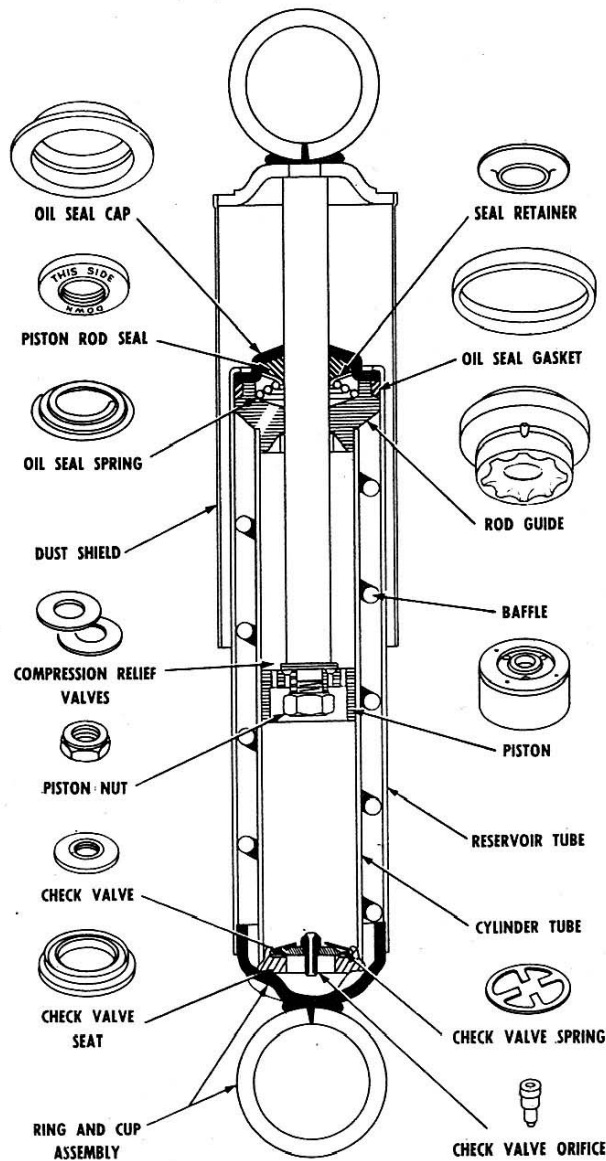
These new Oriflow shock absorbers are one of those features that seem to hit you square between the eyes. Sure, we've all seen new car features come and go, but—well, somehow these Oriflow shocks stick way out ahead of everything. If you've ridden in a car that has them you'll know what I mean. If you haven't—well, you've got a ride thrill comin' up!

These new shock absorbers automatically adjust themselves to road conditions. On a smooth road you'll get a smooth ride; on a rough road you'll *still* get a smooth ride because the shock absorbers will smooth out those severe bumps like nothing you've ever experienced before!

But enough of that. You mechanics will want to know **WHY** Oriflow shocks ride like they do. You'll want to know **WHAT** you, as a mechanic, will have to do with this shock.



Suppose we start out by answering the first question: **WHY** does it ride like it does? The best way that I can do this is to show you **HOW** Oriflow shock absorbers work.



**FIG. 1**

First, let's take a look at the piston assembly, (Figure 1). This assembly consists of a piston, two relief valves, and a piston nut assembled to the lower end of the piston rod.



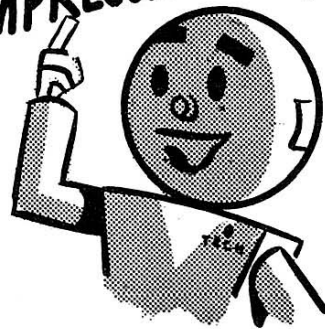
The piston is made of cast iron and has two sets of fluid passages drilled through it from top to bottom. The outer circle passages are very small and are uncovered at all times. The inner circle passages are much larger, but are covered by the compression relief valves. Suppose we take a closer look at these two relief valves. You'll notice that they are flat steel disc-type valves. Just what do they do? Well, they are just what their name implies—relief valves.

#### **COMPRESSION STROKE:**

When the piston moves down rapidly in the cylinder—as it does when the car hits a chuck-hole—there is a large amount of pressure built up within this cylinder. Too much, in fact, for the small uncovered outer passages to handle. This is where these compression relief valves come into play. Upward

pressure of the fluid causes them to flex, or bend, off their seats, uncovering the inner circle of passages in the piston. This allows fluid to flow through both the outer and inner circle passages and into the upper chamber above the piston. At the same time, fluid flows through the check valve orifice, and into the reservoir. In this way extreme pressures are eliminated. These compression relief valves work only on the compression stroke, and then only when the piston movement is rapid. If the piston movement is slow, as it is when riding on a fairly smooth road, the movement of fluid through only the outer circle of passages in the piston is sufficient to provide proper shock absorbing action.

**REMEMBER!  
THE RELIEF VALVES  
WORK ONLY ON THE  
COMPRESSION STROKE.**



**REBOUND STROKE:** On the rebound stroke the compression relief valves are closed. This means that only the small outer passages allow oil to pass through into the lower chamber beneath the piston. This restricts and snubs the shock so that the car will not bounce and pitch. The upward movement of the piston creates a partial vacuum. This vacuum lifts the check valve off its seat and allows oil to flow in from the reservoir to help fill the lower chamber.

**INTERCHANGEABILITY:** Now that we have covered the **WHY** of Oriflow shock absorbers we can cover the **WHAT** angle; what you, as a mechanic, will have to do with these shocks.

One of the first questions that you'll ask, once you have ridden in a car equipped with Oriflow shocks, is: Where can I get them for my car? The answer is—you can't.

(SORRY) YOU CAN'T...



Here's the reason: As we mentioned earlier, these shocks have very high resistance characteristics. That means that mountings have to be extra strong. Oriflow shocks need larger, sturdier mounting studs than the conventional type shocks. The studs found on earlier model cars are not strong enough to withstand the greater pressure built up by the new Oriflow shocks. In addition, other parts—such as the upper control arm—are different.



So, installation of Oriflow shocks on earlier model cars would entail a great deal of additional parts replacement.

**SERVICE:** You've probably been wondering about repair. There is no way to repair the Oriflow shock. It is a sealed unit. If anything goes wrong, you replace the entire shock absorber.

**TESTING:** This brings up the question of ride control. Just how do you check a car equipped with Oriflow shocks for ride control? Well, there is only one fair way to check ride control—a road test. By that we mean a test covering various



road conditions. Drive the car over extremely rough roads to test resistance under *high* piston speed. Then, drive it over a smooth road to test the extent of control under *lower* piston speeds. If you get a smooth ride under *both* rough and smooth conditions the shocks are working all right. But—if you get “bottoming,” excessive bounce, and poor road control, you’ll have to replace the shocks.

You'll remember that back in our film on conventional shock absorbers—Volume 2, Number 8—we gave you a bench test for shocks. We recommended that you check the shock absorbers by moving the piston up and down in the cylinder to test the shock action.

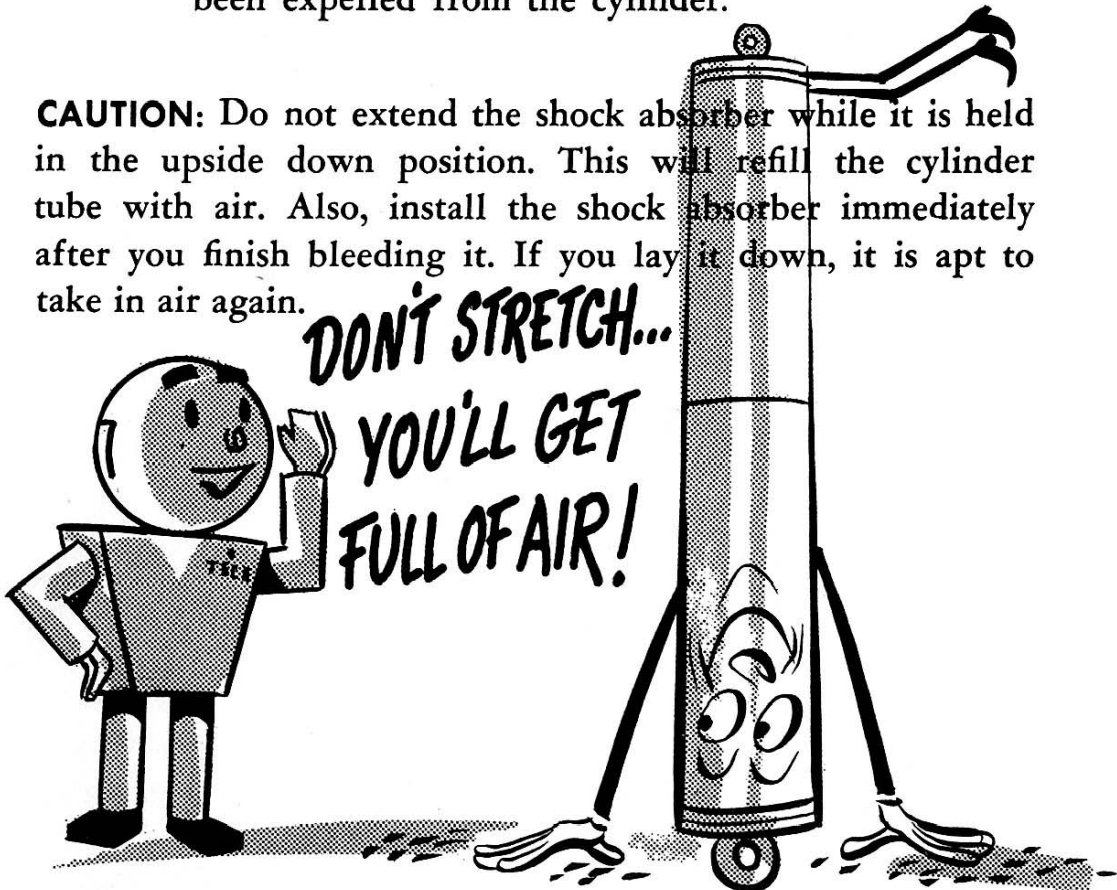
This earlier test *does not* apply to Oriflow shock absorbers. It is impossible to build up enough piston speed to make this bench test. In fact, if you extend and compress these shocks by hand you'll be surprised at how little resistance you feel. You might think the shock wasn't working at all! Don't let this fool you! Take the car out on the road. Only by a road test will you be able to tell whether the shocks are working as they should.



**BLEEDING:** Shock absorbers—and this includes the older type shocks as well as Oriflow type—which have lain in stock for any length of time may have air in them which has seeped into the fluid chamber. So, when you take a new shock out of stock do this:

- 1** Hold the shock in the *upright position* and extend it to its maximum length.
- 2** Turn the shock upside down and close it to its minimum length.
- 3** Repeat (1) and (2) above, two or three times to make certain that all air has been expelled from the cylinder.

**CAUTION:** Do not extend the shock absorber while it is held in the upside down position. This will refill the cylinder tube with air. Also, install the shock absorber immediately after you finish bleeding it. If you lay it down, it is apt to take in air again.



# HYDRAULICALLY OPERATED TRANSMISSION

Changes in the hydraulically operated transmission consist of relocating the ignition interrupter switch, and redesigning the parts which operate this switch. These changes were made to provide smoother performance. The interrupter switch has been moved toward the rear, and is now located directly above the solenoid.

The direct speed piston and the shift rail have been changed. You remember, from reading the reference book for Volume 4, Number 1, that the ignition interrupter switch was actuated by a ramp on the piston. This has been changed. This newly located interrupter switch is now actuated by a pin in the direct speed rail.

**PISTON:** Look at the comparison picture, Figure 2. You'll notice that the new direct speed piston is shorter than the former piston. Actually, this shortening is made possible by eliminating the ramp on

the skirt which actuated the interrupter switch. In addition, the shoulder against which the direct speed fork engaging spring rests, has been shortened. A hardened steel sleeve, almost three inches long, extends from the rear face of this piston. The inside of the rear end of this sleeve has been chamfered to form a ramp for the interrupter switch actuating pin. The upper rear end of the sleeve is provided with a slot.

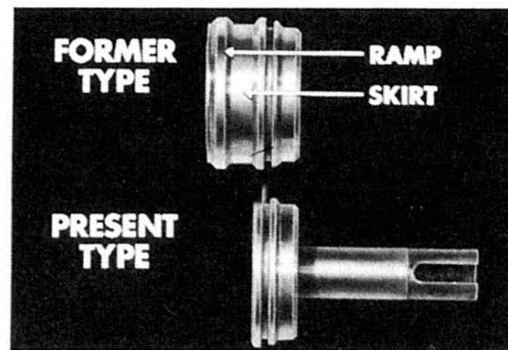


FIG. 2



**SHIFT RAIL:** The direct speed shift rail is longer than formerly. In the rear end of this rail are two drilled holes. The forward hole is for a stationary locating pin. This pin is a tight press fit in the shift rail. The pin fits into the slot in the piston sleeve, and is the means by which the shift rail is moved for the downshift.

The second hole is provided for the interrupter switch actuating pin. This pin is a floating fit.

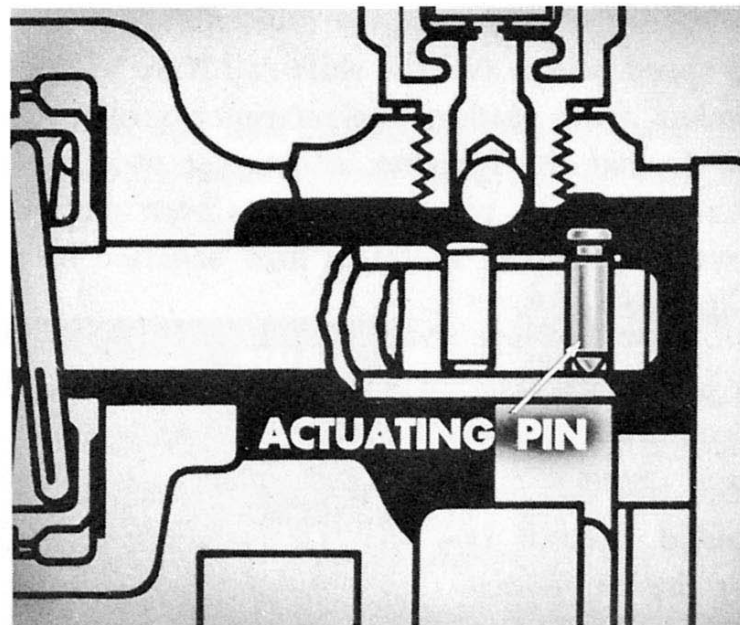


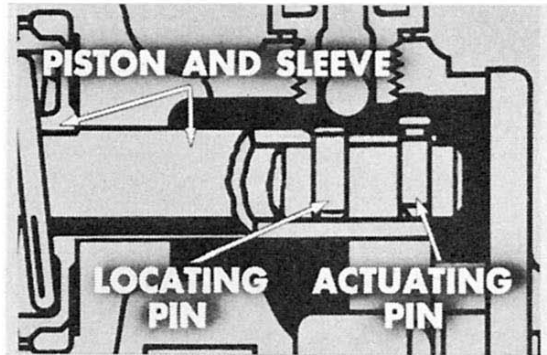
FIG. 3

Figure 3 shows the actuating pin. You'll notice that the head of this pin is chamfered slightly. This head chamfer provides for a gradual movement of the interrupter switch when the actuating pin contacts the switch ball. The lower end of the pin is also chamfered. This chamfer is to aid its movement up the ramp located on the lower inside edge of the piston sleeve.

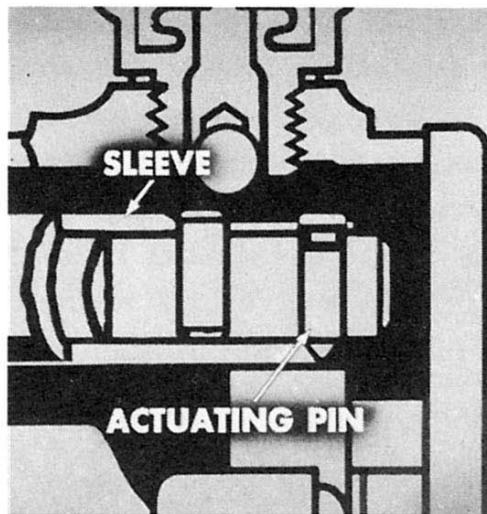
#### **OPERATION DURING**

**UPSHIFT:** Figure 4 shows the piston and sleeve in the rear, or downshift, position. Note that, in this position, the sleeve locating pin is engaged in the forward end of the piston sleeve slot. The

switch actuating pin is in the raised position with the lower end resting in the sleeve just forward of the ramp.



**FIG. 4**



**FIG. 5**

Figure 5 shows the piston just prior to upshift. Oil pressure has built up behind the piston, forcing it forward. This, in turn, has compressed the fork engaging spring. Notice that the shift rail has not as yet started to move forward. The switch actuating pin, however, has dropped down and is resting on its head. The sleeve has moved away from under the actuating pin.

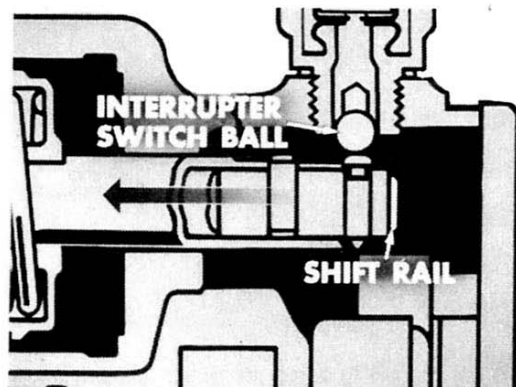
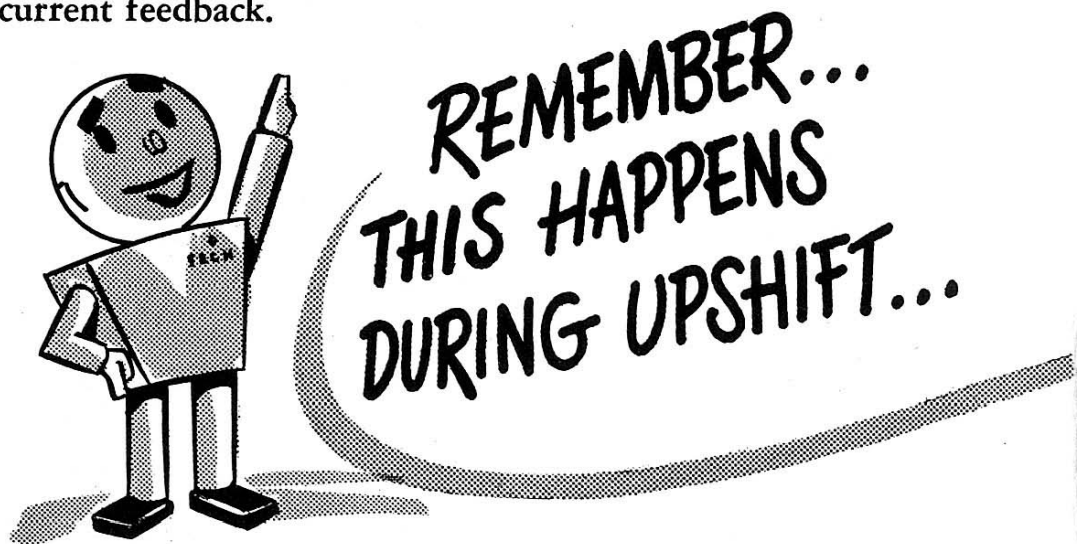


FIG. 6

In Figure 6, the accelerator pedal has been released. The engine has slowed down. The gears have synchronized and the shift is about to be completed. The shift rail, which is attached to the shifting fork, has carried the interrupter switch actuating pin and locating pin forward with it. You'll notice that the head of the actuating pin *does not* touch the ball on the interrupter switch on upshift. And right there is the *reason* why this piston mechanism has been changed. With the pin passing under the switch ball without touching it, there is no danger of ignition interruption on upshift due to current feedback.



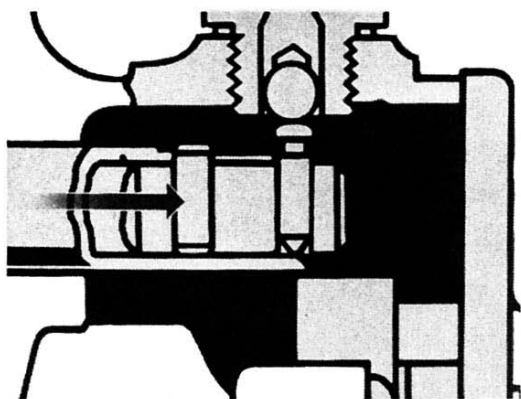


FIG. 7

**OPERATION DURING DOWNSHIFT:** Figure 7 shows the position of the mechanism at the start of the downshift. Oil pressure has just been relieved by the action of the solenoid which has pushed the ball valve off its seat and allowed the oil to dump. Piston and sleeve is moving backward, under pressure of the piston return spring.

As this piston and sleeve moves backward, the forward end of the sleeve slot contacts the locating pin in the rail, causing the rail to move to the rear. At the same time, the ramp on the rear end of the sleeve raises the actuating pin. As the shift rail continues its travel, the actuating pin raises the ball of the interrupter switch. This momentarily interrupts the ignition and relieves torque, so that the downshift can be completed.

*... and THIS  
DURING DOWNSHIFT.*

**DISASSEMBLY AND ASSEMBLY:** Disassembly and assembly of the piston mechanism follows very closely that of previous models. There are a few cautions that might stand repeating, and a few others that are new to this latest piston mechanism.

WATCH  
THESE  
POINTS

You want to be very careful not to lose that switch actuating pin on disassembly. Remember—it's a loose fit in the shift rail. When you install the piston and sleeve assembly, be sure that the slot in the sleeve is up.

On inserting the rail, be sure that the head of the locating pin is up so that it will slide into the slot in the piston sleeve.

This change in location of the interrupter switch, and the use of a new type piston mechanism does not change the procedure for checking out the electrical circuit as shown in the reference book for Volume 4, Number 1 (Hydraulic Transmission Maintenance).

# AUTOMATIC CHOKE

The '51 De Soto and Chrysler models are equipped with a new integral type automatic choke. Actually, this means that the choke is an integral part of the carburetor. It is not a separate unit.

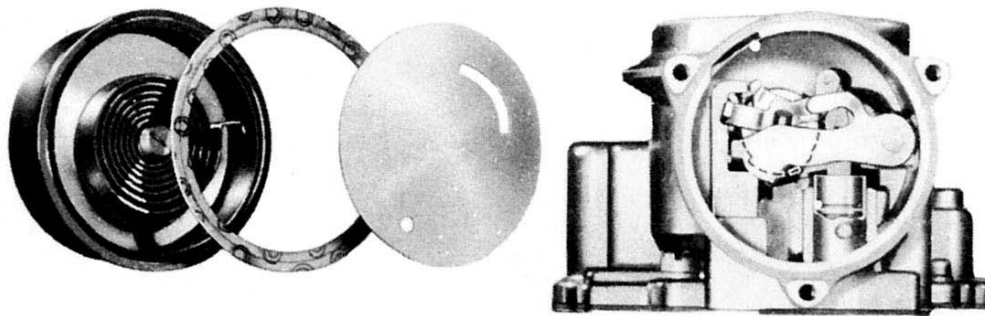


FIG. 8

Figure 8 shows the automatic choke. The choke mechanism is enclosed in a split housing on the side of the carburetor air horn. The outer half of this housing is molded of composition material, and is called the coil housing. This housing contains a thermostatic coil, one end of which is attached to a heat retainer plate. The other end of the coil contacts the choke valve operating lever, and functions to hold the choke valve closed, when the engine is cold. The heat retainer plate functions—as its name tells you—as a retainer for the heat received through the connector tube from the exhaust manifold. The coil and retainer plate are assembled as a complete unit, and should not be separated. Between the coil housing and the inner half of the choke housing is a baffle plate and a gasket.

Figure 9 shows the inner half of the housing, which is a part of the carburetor air horn, and is called the choke housing. This half of the housing contains the unloader arm and trip lever, the choke operating lever, the fast idle cam, the fast idle link, and the choke piston.

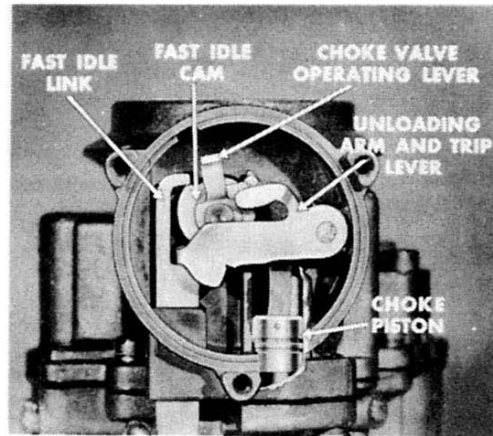


FIG. 9

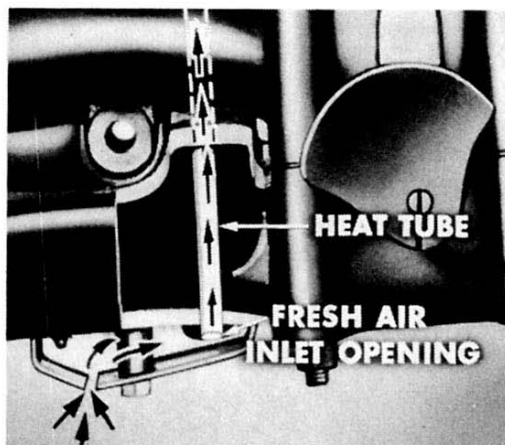
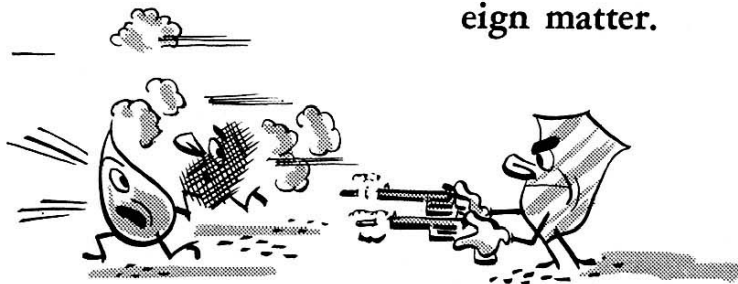


FIG. 10

A heat tube (Figure 10) pressed into the exhaust manifold is connected to the thermostatic coil housing by a connector tube. Air enters the heat tube through an air inlet in the bottom of the heat tube. A shield over the heat tube air inlet helps keep out water, mud and other foreign matter.



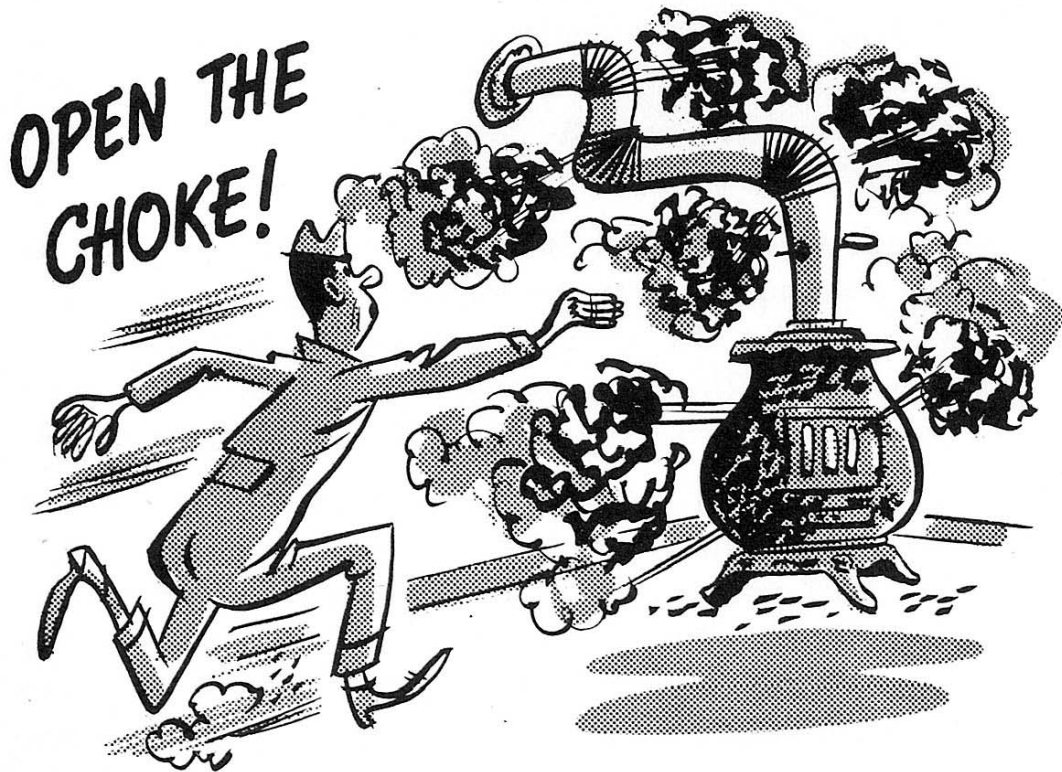
This integral type choke automatically provides uniform engine operation during starting, warm-up, and engine cooling off periods.



### **OPERATION OF THE INTEGRAL TYPE AUTOMATIC CHOKE:**

Suppose we start with a cold engine and show **HOW** the automatic choke aids in starting this engine. After a cold engine is started, manifold vacuum starts to draw air into the thermostatic coil housing through the heat tube inserted in the exhaust manifold. There the air is heated and passes up the connector tube into the thermostatic coil housing. As it enters this housing it is directed, through three separate passages, to the front face of the heat retainer plate.

As this air becomes warmer it begins to heat the retainer plate which, in turn, heats the thermostatic coil. As the thermostatic coil warms up it gradually relieves its pressure against the choke valve operating lever. This reduction in spring pressure, plus the force of the air rushing past the choke valve, causes the choke valve to gradually open.



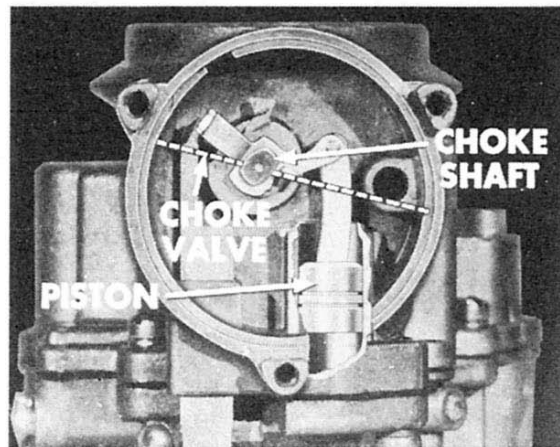


FIG. 11

Take a look at Figure 11. Notice that there is a small brass piston which operates in a cylinder in the housing. The piston is linked to the choke valve shaft through the operating lever which, in turn, controls the position of the choke valve. This piston is operated by manifold vacuum, which tends to pull it down into its cylinder, against the pressure of the thermostatic coil. As this piston is drawn down it rotates the choke shaft, opening the choke valve.

The choke valve is offset in its mounting on the shaft so that the air coming into the carburetor through the air cleaner tends to position the valve according to engine speed and load conditions. Therefore, during warm-up the correct fuel-air ratio is maintained according to the needs of the engine.

While the engine is cooling off, heat is retained by the heat retainer plate. This keeps the thermostatic coil from cooling off too fast and closing the choke valve while the engine is still hot. This action prevents over-choking when starting a warm engine. The thermostatic coil actually allows the choke valve to close completely at approximately seventy-five degrees Fahrenheit.

**FAST IDLE OPERATION:** Provision is made to permit the engine to operate at a fast idle speed until the choke valve is fully open. A fast idle cam (shown in Figure 12) is connected to the choke shaft by a spring. This permits the choke valve to open to prevent over-choking, while at the same time the pressure of the throttle linkage return spring holds a fast idle link against the high side of the fast idle cam to increase the throttle opening and thereby increase engine idle speed.

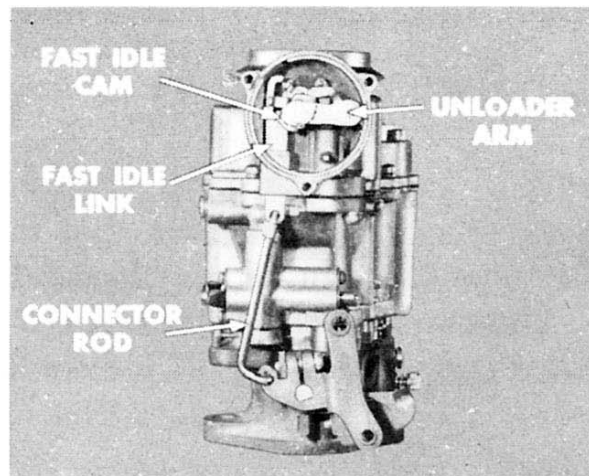


FIG. 12

Figure 12 shows the complete carburetor. You'll notice that the throttle shaft is linked to the choke mechanism through a connector rod and a fast idle link. When the choke valve and the throttle valve are closed, the fast idle link presses against a boss in the unloader arm. This boss rests against the high part of the fast idle cam, preventing the throttle valve from closing completely. As the choke valve gradually opens, the fast idle cam rotates to gradually bring the low part of the cam against the boss on the unloader arm, permitting the throttle to gradually close to the closed position as controlled by the idle speed adjusting screw.

**UNLOADER OPERATION:** In addition to the fast idle mechanism, provision is made for mechanically opening the choke valve to clear out an over-rich mixture in the intake manifold caused by over-choking. If the engine fails to fire as it is being turned by the starting motor, the choke valve can be opened by opening the throttle to the fully open position. Opening the throttle wide draws the connector rod and fast idle link downward. The fast idle link picks up a boss on the unloader arm, drawing the arm down. Another boss on the unloader arm contacts the choke valve operating lever, rotating the choke valve shaft and opening the choke valve. Then, continued cranking will clear out the manifold.

**CHOKE SERVICE:** Dust is the enemy of the automatic choke. Under extremely dusty conditions fine dust may be drawn into the choke. This dust can be very harmful to the brass choke piston. Whenever the choke is serviced it should be washed and dried thoroughly before it is assembled.

**A word of caution before you attempt to oil the carburetor parts. DO NOT use oil on the choke or throttle valve shafts, on the automatic choke mechanism (particularly the brass piston), or on the carburetor linkage.**

Another point that you might check when servicing the automatic choke is this: If the parts inside the housing show a black carbon deposit, check the heat tube inside the exhaust manifold. You'll probably find it's cracked or burned. This has allowed exhaust gas to reach the choke. The heat tube should be replaced if this condition is found.

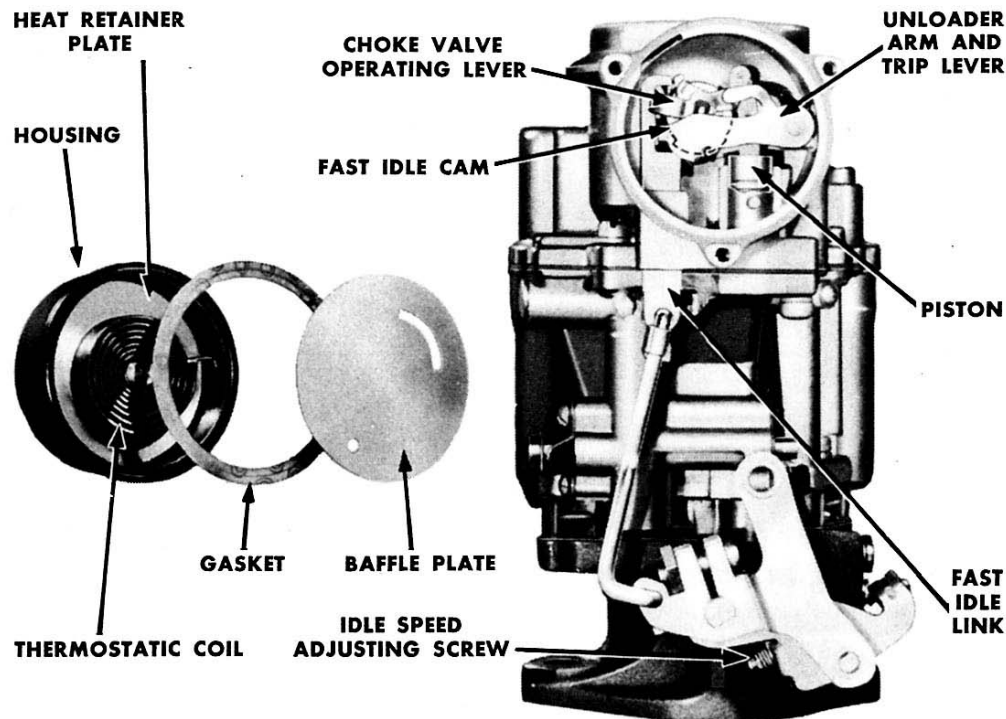


FIG. 13

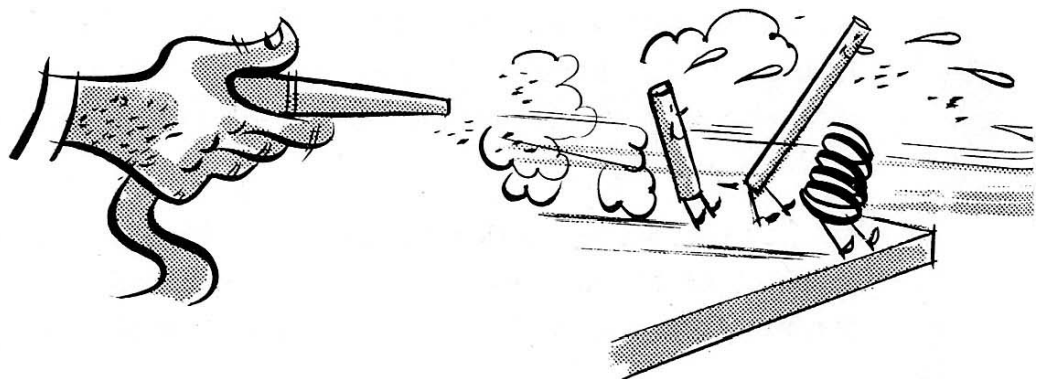
**HOW TO DISASSEMBLE THE AUTOMATIC CHOKE:** (Figure 13)—You'll find that all parts of the carburetor—with the exception of the choke mechanism—are the same as for the former type carburetor. To disassemble the choke mechanism for cleaning, or for replacement of parts, you first remove the carburetor from the engine. Be sure to hold the brass fitting on the thermostatic coil housing with a wrench when disconnecting the connector tube. This avoids damage to the molded housing.

1. Remove screws and retainer clips which attach the choke housing to the air horn. Lift off the housing containing the thermostatic coil and heat plate, gasket, and baffle plate.

2. Remove the choke control rod retainer clip and disengage the choke control rod from the fast idle link.
3. Slide out the choke trip lever, and the fast idle link will drop out of air horn.
4. Remove the choke valve screws and lift out the choke valve.

**NOTE:** Choke valve screws are staked. Remove carefully to avoid stripping or breaking.

5. Turn choke shaft counterclockwise, as you push in on the fast idle cam, to disengage the choke piston from the cylinder. Remove shaft and attached parts from the air horn. Care should be taken to prevent loss of the small pin which attaches the piston to the shaft link.
6. Unhook the fast idle cam spring from the choke shaft lever. Slide the fast idle cam and spring assembly from the choke shaft.
7. Remove the piston pin and separate the piston from the link.
8. With a suitable solvent, clean all choke parts, and dry with compressed air.



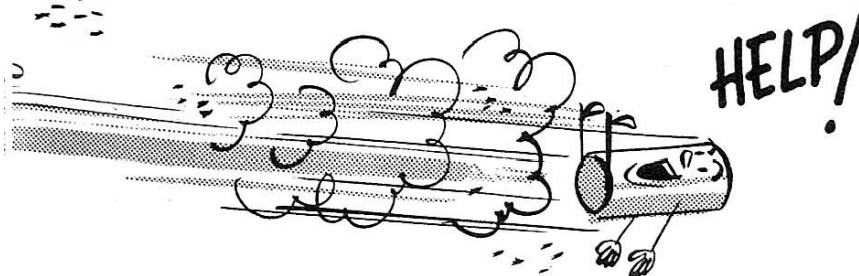
9. In cases where parts are heavily coated with dust, or other foreign matter, it is a good idea to remove the air horn so that the piston cylinder can be properly cleaned. To remove the air horn, remove the five screws and lock washers that hold the air horn to the carburetor body. Be certain that slots and grooves in the cylinder wall and on the piston are thoroughly cleaned. Examine the small opening in the base of the cylinder to be sure it is open. Dirt, or other foreign matter, restricts movement of the piston.

10. Examine the choke parts for wear or damage. Replace those parts found to be worn or damaged in any way.

#### **CAUTION:**

**Do not attempt to separate the thermostatic coil from the heat retainer plate. These parts, together with the molded housing, are serviced as a complete unit.**

If the housing is cracked or broken, replace with a complete new assembly. That indication mark cut in the rim of the housing is correct only for the originally installed thermostatic coil. To remove the thermostatic coil and heat retainer plate from the housing, hit the housing sharply against the heel of the hand, coil-side down. To replace coil and heat retainer plate in the housing, line up the notch in the plate with the lug in the housing. Press down firmly on the plate until it is seated in the housing.





## HOW TO REASSEMBLE THE AIR HORN AND CHOKE PARTS:

1. Attach the choke piston to the shaft link with the piston pin.
2. Slide the fast idle cam on the choke shaft and hook the fast idle cam spring over the spring anchor on the choke shaft lever.
3. Insert the choke shaft and piston into the air horn. Turn the shaft counterclockwise until it is possible to insert the piston into the cylinder. Make sure that the fast idle cam shoulders are on the boss of the air horn.
4. Turn the choke shaft clockwise until the piston drops into the cylinder.
5. Using new screws, fasten the choke valve to the choke shaft. Hold the valve in closed position and tap gently with screw driver to center and locate the valve. Tighten screws. With the valve open, stake the screws by squeezing with pliers. Now, hold the air horn upright and close the choke valve. It should open freely by its own weight.

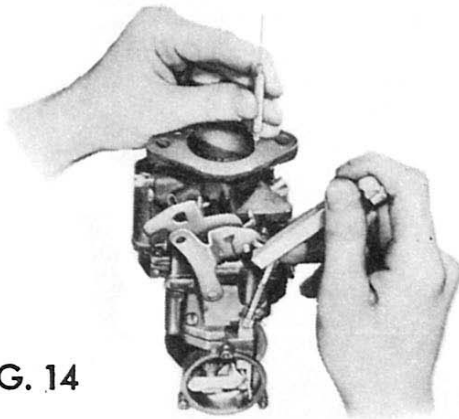


WADD'YA  
KNOW...  
IT DID!

6. Place new air horn gasket on main body. Install air horn. Replace retaining screws and lock washers and tighten securely.
7. Insert fast idle link with slot facing choke shaft. At the same time, install the trip lever so that the arm on the trip lever engages the slot in the fast idle link.
8. Engage the choke control rod in the throttle lever. Engage other end of rod in the hole in the bottom of the fast idle link. Snap the retainer clip into place on the choke control rod.

#### **MAKING THE FAST IDLE ADJUSTMENT:**

- (a) Back out the idle speed adjusting screw in the throttle lever (Figure 13) until it is clear of the stop lug on the throttle body.
- (b) Turn the carburetor bottom side up. Hold the choke valve shut with the choke operating lever.
- (c) Hold the throttle valve closed. With valve shut it should be possible to insert an .018-inch wire gauge (Tool T-109-44) between the throttle valve and the bore of the throttle body opposite the idle port.

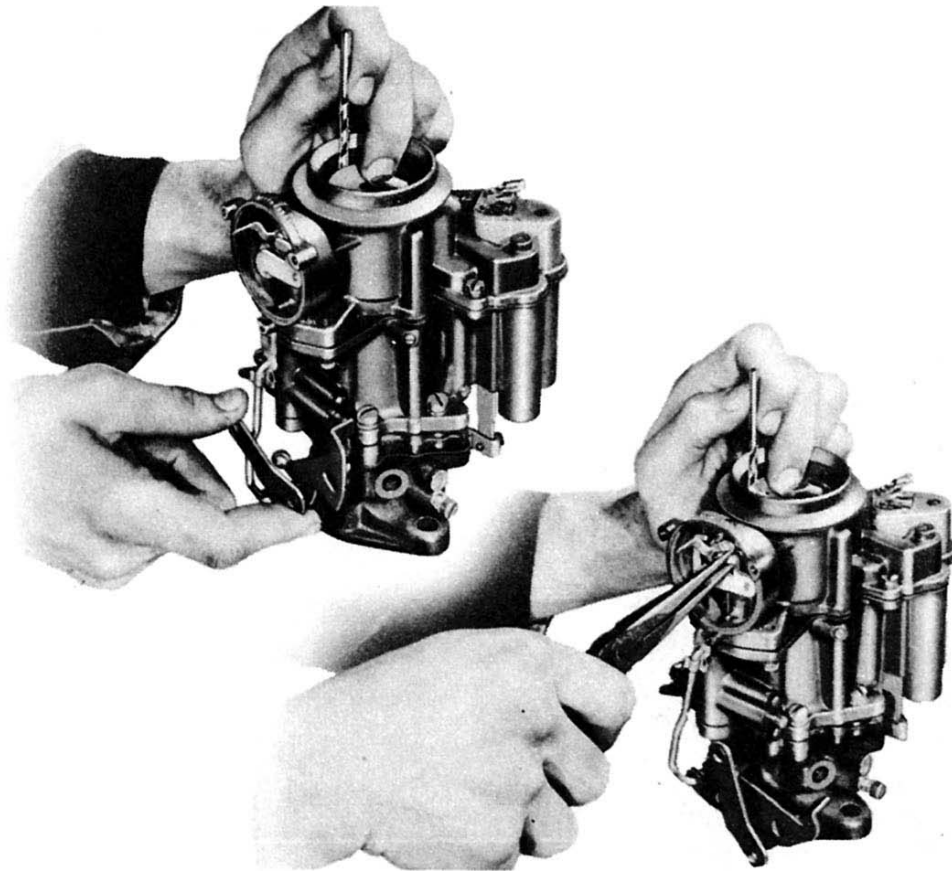


**FIG. 14**

- (d) If this opening isn't correct, you'll have to bend the lower end of the choke connector rod. Bend it upward to decrease the clearance; downward to give more clearance. Use bending tool T-109-41-T to do this operation.

### **MAKING THE UNLOADER ADJUSTMENT:**

- (a) Hold the choke valve closed lightly with a finger.
- (b) Open the throttle wide.
- (c) The choke valve should be open enough to allow tool T-109-154 (or a  $\frac{5}{32}$ " drill) to be inserted between the choke valve and the inside bore of the air horn on the short side of the valve.
- (d) If necessary, bend unloader arm on trip lever until desired clearance is obtained. (Bend arm downward for less clearance; upward for more clearance.)



**FIG. 15**

After making the unloader adjustment and the fast idle adjustment, continue with the reassembly of the choke parts as follows:

9. Hold the choke valve closed. Install the baffle plate, together with a new gasket. Make sure that the baffle plate is centered on the pin in the housing, and the slot for the choke valve operating lever permits full travel of the lever.

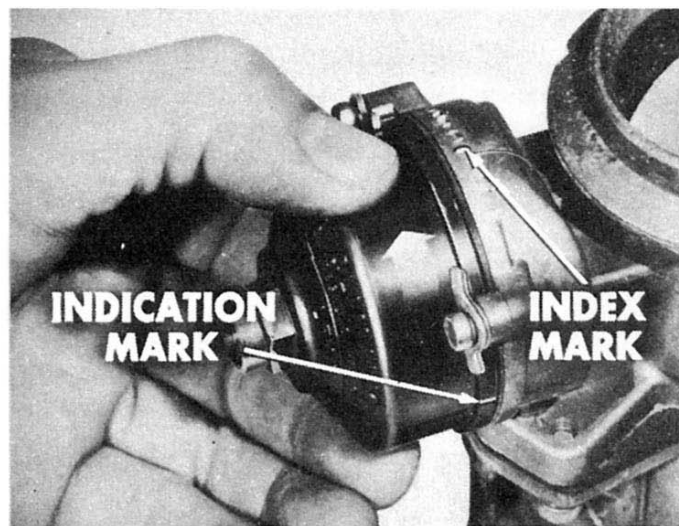


FIG. 16

10. Install the coil housing assembly. Indication mark on the housing should be in the straight down position. Install the retainer clips and screws loosely. Hold the coil housing in place and slowly turn the assembly counterclockwise until the indication mark on the housing is in line with the center index mark on the air horn (see Figure 16). During this operation you should feel a slight tension as the hooked end of the thermostatic coil picks up the choke operating lever.

11. Tighten the screws, holding the coil housing to the air horn.

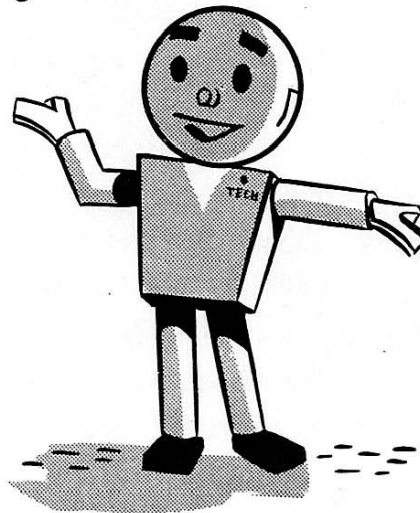
**NOTE:** For continued uniform performance from the choke, make sure that the indication mark on the coil housing is always lined up with the center index mark on the air horn. Disregard the graduations on the carburetor-half of the choke housing.

There is no need to change the position of the coil housing for hot- or cold-weather driving conditions, or for changes in altitude.

**ADJUSTMENTS:**

*Idle mixture and speed adjustment:* Before attempting to adjust the idle, the engine should be run until full operating temperature is reached. Make certain that the choke valve is in its wide-open position. Set the engine idle speed at 450 to 500 r.p.m. with the idle speed adjusting screw.

**THAT'S ALL FOR NOW!**



# QUESTIONNAIRE

TEST YOURSELF  
WITH THESE QUESTIONS!

1. Resistance in the Oriflow shock absorber is controlled by fluid passages in the piston which determine the rate of piston movement. RIGHT ☐  
WRONG ☐
2. The best way to test the operation of the Oriflow shock absorber is to compress and extend it by hand. RIGHT ☐  
WRONG ☐
3. Shock absorbers taken from stock should be held in an upright position, extended two or three times to force air out of the fluid chamber before they are installed on a car. RIGHT ☐  
WRONG ☐
4. The thermostatic coil in the integral type automatic choke allows the choke valve to open gradually as the engine warms up. RIGHT ☐  
WRONG ☐
5. The heat retainer plate in the integral type automatic choke keeps the thermostatic coil from closing the choke valve too soon as the engine cools off. RIGHT ☐  
WRONG ☐
6. If the thermostatic coil becomes broken it is easily replaced by removing a set screw which attaches the coil to the plate, and substituting a new coil. RIGHT ☐  
WRONG ☐
7. The newly located ignition interrupter switch on the hydraulically operated transmission is operated by a pin called an actuating pin. RIGHT ☐  
WRONG ☐
8. The carburetor choke valve is offset in its mounting so that air flowing into the carburetor can regulate the valve opening according to speed and load conditions. RIGHT ☐  
WRONG ☐
9. The ignition interrupter switch ball is raised by the actuating pin during upshift. RIGHT ☐  
WRONG ☐
10. When set on the fast idle cam, the throttle valve should be open .018-inch, measured between the throttle valve and the throttle body. RIGHT ☐  
WRONG ☐

NEXT MONTH...  
MORE '51 FEATURES

