Just one reader to-night

LECTURE 10

The Carter YF Carburetor

A new innovation in method of metering rod and pump control is brought out in the model YF carburetor. A single diaphragm which controls both metering rod position and pump discharge provides not only instantaneous metering response through the high speed circuit but also controls pump discharge commensurate with the load and speed demands of the engine.

Let's look into the model YF - we have one practice carburetor which is a manual control choke, the other is Climatic Control. All the circuits except the choke will be the same.

The manual choke used on some YF carburetors makes use of a coil spring to exert a lateral pressure on the fast idle connector rod - shown in Figure 115. This spring acts not only as an anti-rattler but is used primarily to prevent partial closing of the choke valve (fluttering) after the choke control has been moved to wide open position. Let's all take a look at this spring. Open and close the choke valve to show its action.

Move the choke lever "closed" just a little (from wide open position) to show this action.

Let's go to work! Both of you remove the fast idle connector rods - then remove the air horn with the bowl cover intact. First, let's look into the float circuit.

Remove the float pin. Whoa!!! Don't lay that pin down - look at it. Notice the small shoulder near one end of the pin. The end of the pin with the shoulder must go toward the *outside* of the carburetor - if it were installed from the other side the pin could vibrate out and fall down into the bowl, loosening the float and allowing the needle to fall out of its seat. Always be sure to install this float pin in its correct position.

Remove the float. Examine it for dents, worn pin holes and wear

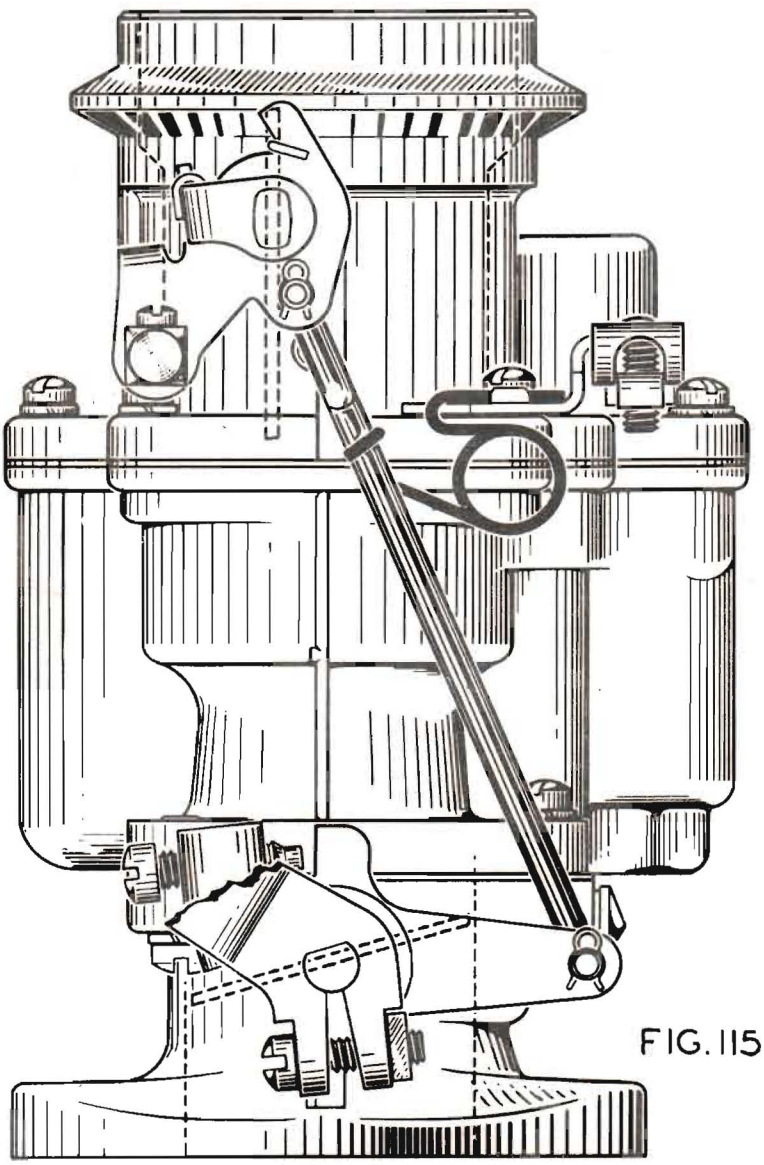

FIG. 115

THE CHOKE CIRCUIT

CARTER MODEL YF

on the float lip. The float lip should be serviced in the usual manner with a strip of emery cloth.

Remove the needle and seat. Some YF carburetors use a spring loaded needle, others use the solid type needle. Spring loaded needles reduce tendency to flood under extreme vibration: solid needles tend to reduce slight flooding conditions when the trouble is due to small foreign particles in the fuel. Remember that - you may have to make this change some time due to unusual operating conditions or fuels. Once more - use a spring loaded needle to overcome flooding complaints due to excessive vibration: use a solid needle to overcome complaints of slight flooding conditions due to small particles of foreign material in fuels. However, don't forget that a change in float level setting will be required when making this substitution - and some carburetors may require a different float in conjunction with a spring loaded needle. (See your parts list on the specification sheet.)

Now let's look at the needle seats. Some YF carburetors use a needle seat with a long extension above the threads whereas others use the short extension such as we find on the 25-33S, 25-172S etc. The difference in these needle seats is shown in the parts group picture of the 735S - 736S International Truck specification page. One of you turn to that page in your service manual so we can compare the pictures of the needle seats. LOOK at them!

The long extension on the seat acts as a "stand-pipe" for the incoming fuel, to allow any small foreign particles to settle around the extension rather than come past the needle. The extended type seat can be used only with the bowl covers which have sufficient space for the extension (some models do not provide for this type needle seat.)

What type bowl vent is used on this carburetor? One of you show us, using Figure 116 and your bowl cover.

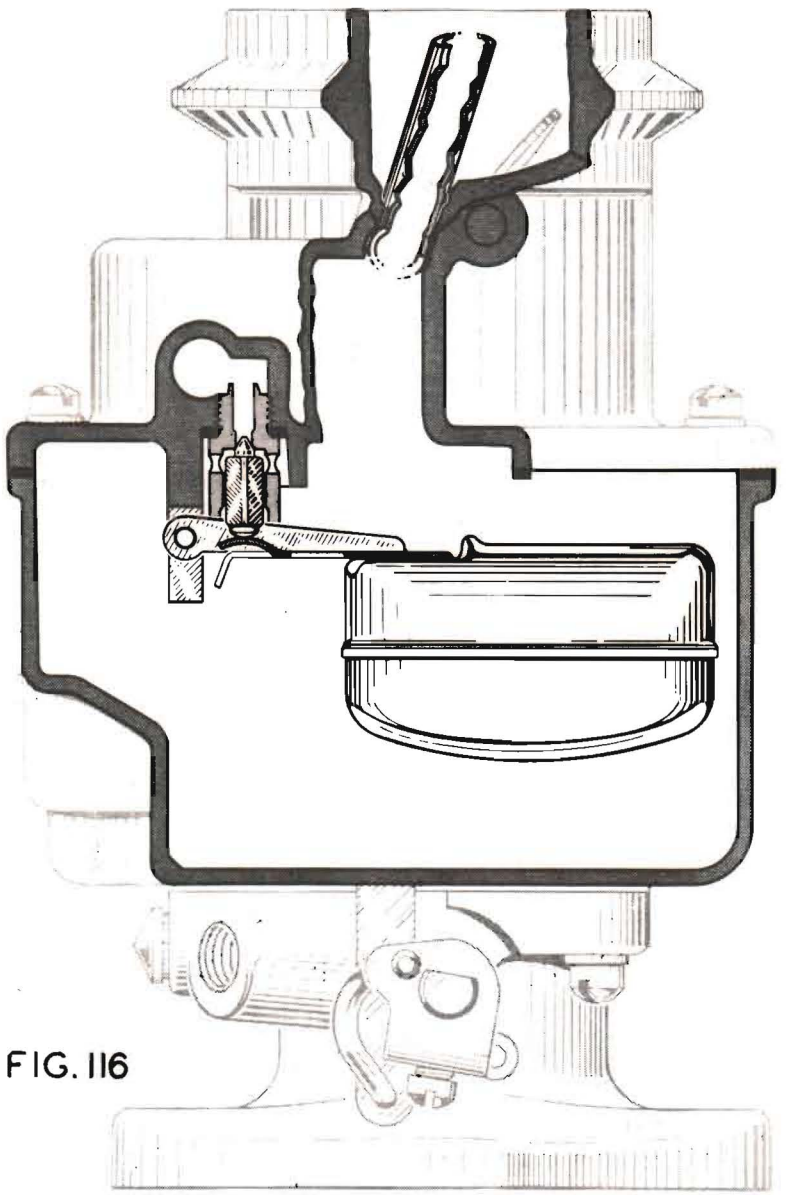

FIG. 116

THE FLOAT CIRCUIT

CARTER MODEL YF

So much for the float circuit - we have been through enough of them that you should know their action by this time. Let's carry on into the low speed circuit.

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Remove the low speed jet. Notice that it is the same type jet used in the WA-1 and BB carburetors. It seats only at the shoulder - just below the threads. Check for a seal at the shoulder. It should show as a dark line all the way around the shoulder of the jet. Look at the seat in the casting. There must be no nicks to allow a leak.

Follow the passage through the by-pass, economizer and idle bleed. On some carburetors part of this passage is an indentation in the bowl cover casting, whereas on others it's in the body casting. Look at your carburetors, what type do you have? Inspect the bowl cover gasket to be sure there is no air leak. What complaint would an air leak at this point cause?

Wait for his answer!

Loosen the clamp screw on the throttle shaft arm assembly. Slide it off the shaft with the pump connector link - then remove the flange assembly. One of you show us the entire low speed circuit. Be sure to include in your explanation the bypass, economizer and the idle bleed. Also show us the low speed passage all the way to the idle port. When he's finished I'll show you what I know about it using Figure 117.

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Time out - 10 minutes for explanations.

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Some YF carburetors use a dust seal around the throttle shaft. It is a small felt washer with a metal washer and spring on the extended end of the shaft. A synthetic rubber seal with a retainer is sometimes used instead of a felt seal at the lever end of the shaft. However, both types are used. When cleaning a carburetor with dust seals, be sure the seals are not immersed in cleaning solvent for a long period of time. It is best to install new seals each time the carburetor is overhauled.

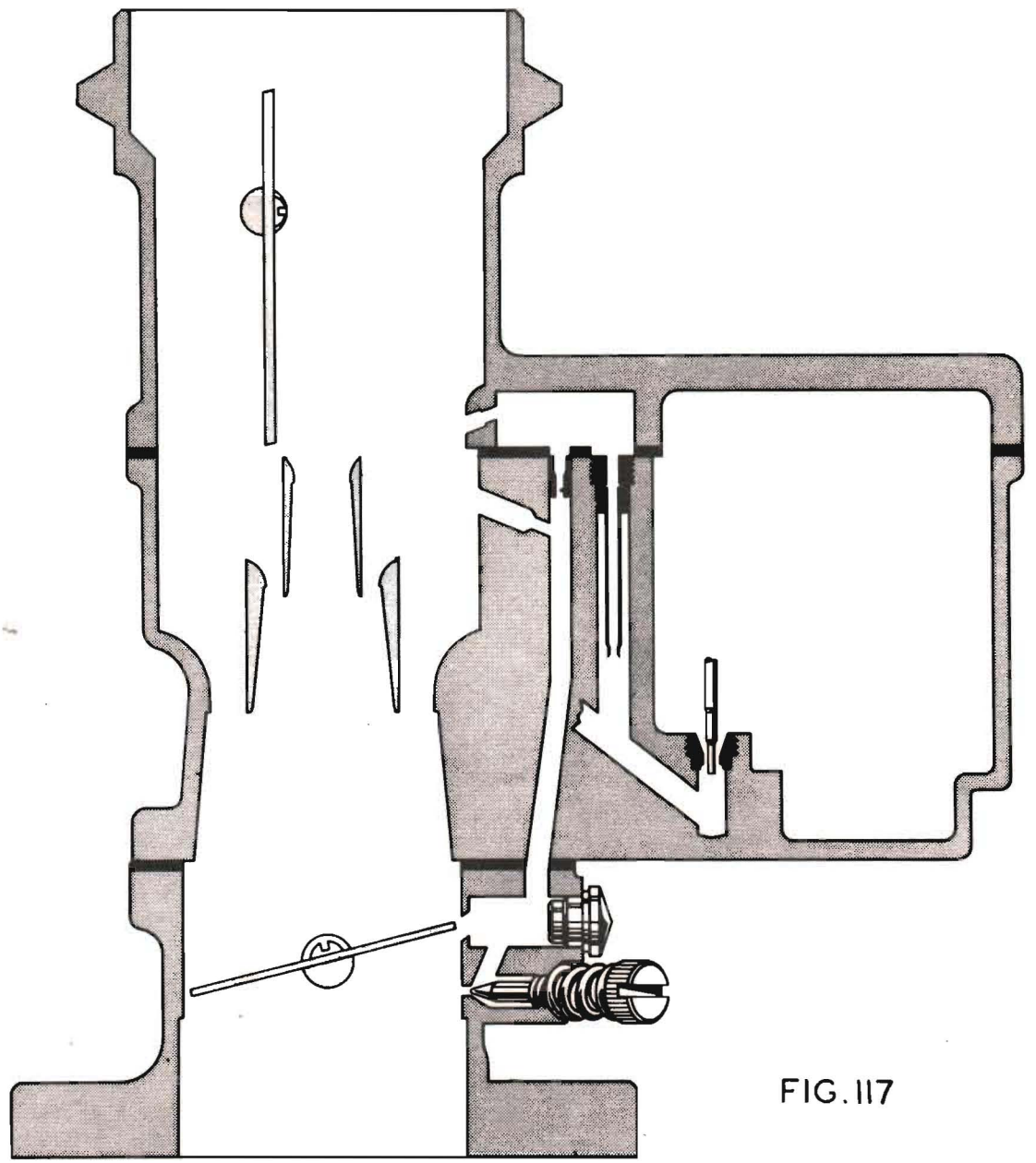

FIG. 117

THE LOW SPEED CIRCUIT

CARTER MODEL YF

Next let's look at the high speed circuit. The high speed circuit and the pump circuit are inter-connected in that the diaphragm assembly controls both metering rod position (vacumeter) and pump discharge. To simplify this action we'll cover both the high speed and pump circuits together discussing their inter-connection. One of you reinstall your flange assembly, pump connector link and throttle shaft arm assembly. No - just one of you do it. Now let's look at the carburetor with the flange. Hold the throttle valve closed and press down on the top of the diaphragm shaft. Notice that the metering rod and carrier moves downward against the lower spring pressure until the carrier contacts the pump lifter link. This amount of movement is the vacumeter control of this carburetor.

Wait for him to do it!

Vacuum from the manifold below the diaphragm holds the metering rod in the down position as long as the engine is operating under a light load. Push the plunger down to show us - hold it there. Continue to press lightly on the plunger and slowly open the throttle. Notice that the metering rod and the diaphragm shaft are raised mechanically. Again close the throttle and open it approximately half way. Release the diaphragm shaft. Notice how the metering rod is lifted. That is the action that takes place under acceleration (heavy load), but is again pulled down when the load is relieved (push down on the diaphragm shaft but hold the throttle in the same position.)

Let's go back to the blue star and try it again.

* * *

Do you understand now - let's carry on into the pump circuit action.

Close the throttle - then slowly open it. Watch closely - see how the diaphragm shaft moves as the throttle is opened wide. The distance the shaft moves indicates the amount of pump discharge. This amount is all that can be discharged from the pump with the engine not operating.

Again close the throttle and this time push the diaphragm shaft down. Release the shaft and open the throttle wide. Notice how much farther the shaft moved this time. That is the amount of pump discharge possible with the engine running. Only about 1/2 of the maximum capacity of the pump can be discharged with the engine not in operation - the balance is controlled by intake manifold vacuum which is a true indicator of engine fuel requirements.

Let's look at the parts controlling this action. Remove the throttle shaft arm and pump connector link on the carburetor with the attached flange. Both of you remove the four diaphragm housing screws and lift the entire diaphragm housing, metering rod and lifter link assembly out of the bowl.

Disconnect the metering rod spring and remove the metering rod. Place the assembly on the table with diaphragm down and the lifter link extending over the edge of the table. Use your fingernail or a screw driver blade to compress the upper spring. Lift off the spring retainer. Be careful not to get hit by the spring when it jumps at you. Remove the metering rod carrier and lifter link. Compress the lower spring and remove that retainer and spring. Carefully loosen the diaphragm from the casting and slide out the diaphragm and shaft assembly. If your carburetor contains the small circular strainer at the top of the diaphragm housing, remove it. It should be removed from all YF carburetors.

Look at the parts list in your specification sheet. Go ahead - I'll wait for you.

Find part number 30-62. Read the nomenclature which states "pump intake strainer - *discontinued.*" Whenever you find this in a parts list, remove the part and do not reinstall it - leave it out.

If the same diaphragm housing is to be reinstalled, a small notch should be cut in the circular reservoir where the strainer was installed. This will eliminate the possibility of "puddling" or

collecting dirt which might clog the small intake hole. This is shown in Figure 118. Later style pump diaphragm housings will not have this upper recess.

> NOTE: This is in effect as of this writing. It may be countermanded at some future date due to engineering changes. Refer to latest bulletins and specification sheets for specific information.

Now let's look into the operation of the high speed circuit. Use Figure 118. The metering rod is controlled both mechanically and by vacuum. Note however, that complete intake manifold vacuum is not applied to the bottom of the diaphragm - there is a restriction in the passage leading to the manifold and a second passage leading to the base of the main venturi. Naturally, the sizes of the restriction and the secondary passage are critical as at lower speeds air will bleed into the secondary passage resulting in a vacuum below the diaphragm less than in the manifold. However, at throttle positions approaching wide open, we will find intake manifold pressure all the way up to the base of the main venturi (above the throttle valve) resulting in complete manifold vacuum under the diaphragm.

Think that over for a few minutes and let's discuss it. We'll use Figure 118 for our discussion.

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Time out - not more than 5 minutes.

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The vacuum in the lower diaphragm chamber opposes the upward pressure of the lower spring. During part throttle operation (light

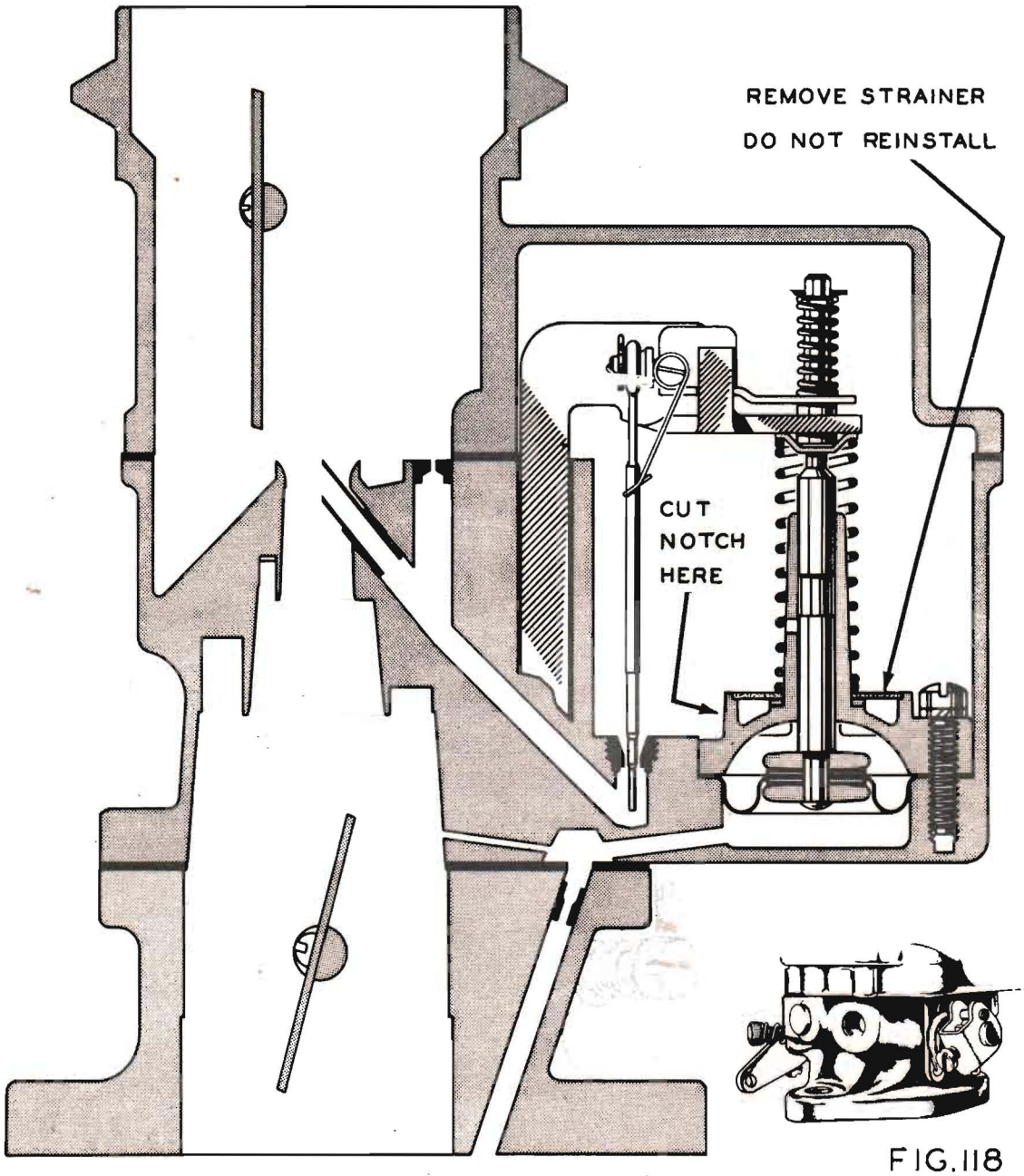

FIG.118

THE HIGH SPEED CIRCUIT
CARTER MODEL YF

load) the low pressure in the vacuum chamber (below the diaphragm) holds the diaphragm assembly down holding the metering rod arm down against the lifter link. If the throttle is opened slowly and the vacuum below the diaphragm remains great enough to offset the upward pressure of the spring, the metering rod arm will stay against the lifter link but the rod will be raised by the lifter link (mechanically). However, if throttle movement is rapid enough to decrease the vacuum below this critical point, the spring will push the metering rod arm up off the lifter link, lifting the metering rod up in the jet (vacumeter action).

Fuel flows from the bowl through the metering rod jet and the high speed passage to the nozzle. Percolation is prevented by the anti-percolator well which Figure 118 shows to be vented to the inside of the air horn. Some YF carburetors use a solid plug at the top of the well with a bleed passage leading from the top of the anti-percolator well to the inside of the nozzle tip. This is similar to the anti percolator operation of Lucky's carburetor last week. Do you remember? If not, turn back to the picture of the WCD high speed circuit. Show us!

The nozzle, anti-percolator well bleed plug and many of the restrictions are pressed in parts and must not be removed.

The pump circuit operation should not give us any trouble - we have covered its operation in previous lectures. One of you show us how it operates - use Figure 119.

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Time out - 3 minutes.

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Just to check on him - here's how it operates. One of you follow me, using Figure 119. Vacuum is applied to the under side of the diaphragm whenever the engine is in operation. As the

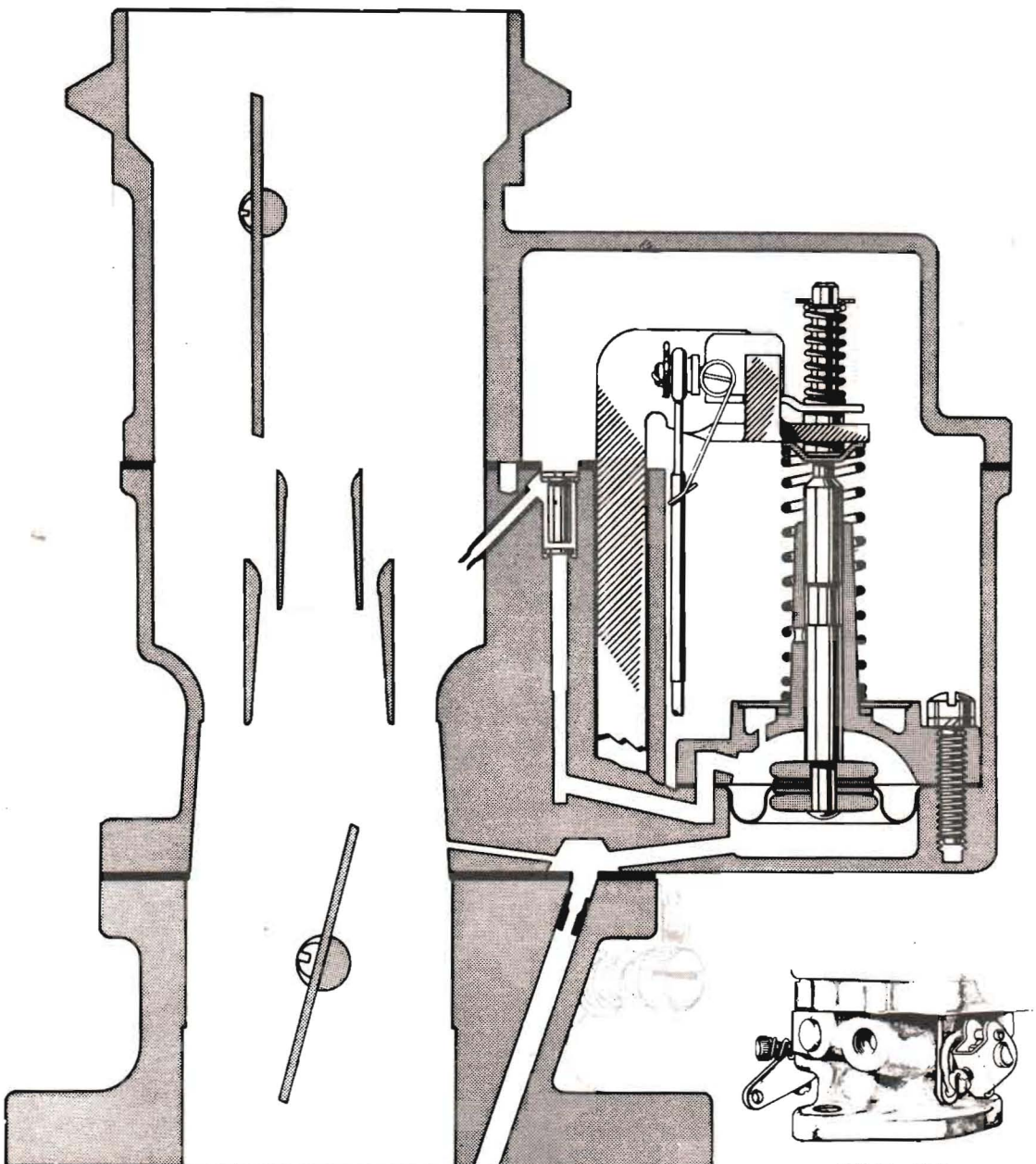

FIG. 119

THE PUMP CIRCUIT
CARTER MODEL YF

diaphragm is pulled downward fuel from the bowl enters through the intake restriction. No air can enter through the pump jet because of the sealing action of the discharge check valve. Due to its construction with the intake restriction in the upper part of the dome, any vapors accumulating within the fuel chamber will be forced out the small hole into the bowl(as bubbles.)

As the throttle is partially opened the decrease in vacuum (rise in pressure) in the manifold is transferred to the bottom of the diaphragm. The lower pump spring pushes the diaphragm shaft upward forcing the fuel past the discharge check and out the pump jet. Some fuel will be forced through the intake restriction back into the bowl. This is an economical action in that if the throttle is opened gradually the amount of fuel forced back into the bowl is much greater than if the throttle is suddenly opened. A gradual throttle opening requires little or no pump discharge.

If the throttle is suddenly kicked open the upward movement of the lifter link will be much more rapid than diaphragm action so the lifter link compresses the upper spring increasing the upward pull on the diaphragm shaft. Therefore, we can say that the upper spring provides the delayed action for fast acceleration and it also serves as a "bumper spring" during deceleration (it absorbs the shock of the downward travel of the plunger shaft.)

Figure 119 shows the "disc type" discharge check valve. Some carburetors use a small aluminum needle as the check valve, others use an aluminum ball, which on some models is augmented by a small weight over the ball. Refer to your specification sheet parts list for the correct parts for your carburetor.

Some models use an intake ball check instead of the intake restriction and some use a spring loaded discharge ball in the diaphragm housing.

Some YF carburetors do not use a pump jet, but discharge the pump

fuel directly into the nozzle passage. On some of these models one of the diaphragm attaching screws breaks through into the pump discharge passage so that screw head must carry a copper gasket instead of the conventional lock washer in order to effect a seal. Watch this carefully - don't be guilty of causing poor acceleration in this carburetor by installing the copper washer under the wrong diaphragm attaching screw.

Figure 119 shows no pump relief. This will allow pump "pull over" at constant throttle high speed operation. Some carburetors use a small relief passage between the pump jet and the bowl.

One of you use Figure 119 to show us how the pump circuit operates. When he is finished the other man will show us how the pump circuit operates using the body casting and the parts.

Help them - if they need it!

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Time out - 10 minutes for explanation.

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There's no need to go into the operation of the Climatic Control as it has been covered twice and I think we all understand it so let's start to rebuild.

First we will attach the flange to the body casting. Be sure the flange gasket is correctly installed.

Wait for them to do it.

Next, let's rebuild the float circuit. Install the needle seat, needle, float and float pin. Do not install the bowl cover gasket. Look at your specification sheet to determine the float setting. Don't forget, the spring loaded needle requires a different gauge than the solid needle. Go ahead and set your floats - the same method we used in setting the W1 carburetor float. Be sure to adjust by bending the float lip. Install the bowl cover gasket and set the assembled bowl cover to one side.

Wait for them!

Slide the diaphragm shaft into the diaphragm housing and install the lower spring and spring retainer. Install the pump lifter link the metering rod arm, upper spring and spring retainer. Carefully insert the four diaphragm attaching screws and washers, threading them down through the diaphragm. THIS IS VERY IMPORTANT. Be very careful the diaphragm is not wrinkled or torn at the attaching screw holes.

Slide the lifter link down into place, carefully lowering the diaphragm housing into place in the body casting. Tighten the four attaching screws evenly so as not to wrinkle the diaphragm. Dust seals should be installed if they are used on your carburetor. Install the pump connector link and throttle shaft arm and tighten the clamp screw. Install the discharge check valve and retainer ring. Install the metering rod but do not attach the metering rod spring.

No pump adjustment is required on the YF carburetor. However, the metering rod adjustment is extremely critical and must be set each time the carburetor is serviced or leaner than standard rods are installed. Correct procedure as follows:

METERING ROD ADJUSTMENT - YF CARBURETOR

Back out throttle lever set screw to allow the throttle valve to seat in the bore of the carburetor. Press down hard on upper end of the diaphragm shaft. Press hard enough to compress the upper spring - until you can feel the diaphragm bottom in the casting. With throttle valve seated and diaphragm shaft held in this position the metering rod should be bottomed in the casting. A side to side movement of the carburetor should allow the upper end of the metering rod to slide freely back and forth on the metering rod pin. Adjust by bending metering rod pin lip on the metering rod arm up or down.

The use of tool T109-212 will greatly facilitate making this adjust-

ment. Correct application of tool is shown in most specification sheets. (For example: 735S - 1950-51 International Truck).

Don't forget to connect the metering rod spring.

Let's finish rebuilding these carburetors. Don't forget the bowl cover gasket when installing the bowl cover assembly. Are you sure the float pin has been properly installed? Go ahead - button them up.

Wait for them to finish

FAST IDLE ADJUSTMENT - MANUAL CONTROL

Only one adjustment will be necessary on the manual choke carburetor. It will be made as follows: With choke valve held in wide open position bend fast idle connector rod (at offset portion) until lip of fast idle arm just contacts the boss on body casting. Most specification sheets have a picture describing this adjustment - take a look.

Let them look!

FAST IDLE ADJUSTMENT - CLIMATIC CONTROL

Remove the thermostatic coil housing, gasket, and baffle plate. Hold carburetor in upright position and crack throttle valve slightly. Hold choke in closed position and close the throttle valve. This will allow fast idle cam to revolve and choke trip lever will now be on the highest step of cam. There should now be a specified clearance between the throttle valve and the bore of the carburetor (side opposite idle port). Adjust by bending the choke connector rod at lower angle.

Turn to your specification sheet to find the exact clearance required. A picture describing this adjustment will usually be found on the specification page.

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UNLOADER ADJUSTMENT

Unloader adjustment must be made after the fast idle adjustment has been made. With thermostatic coil housing, gasket and baffle plate removed, hold the throttle valve wide open and close the choke as far as possible without forcing. There should now be a specified clearance between lower edge of choke valve and the inner wall of air horn. See your specification sheet for this clearance. Adjust by bending lip on choke trip lever - use tool T109-187.

Reinstall the baffle plate, gasket, thermostatic coil housing and retainers. Set to position indicated in specification page.

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Take these carburetors to the next Central Meeting!