The Zenith Stromberg Carburetor

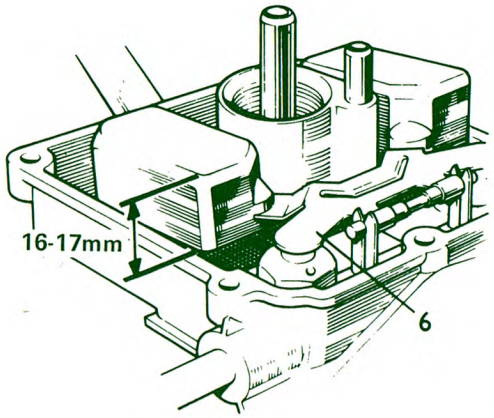
REFERENCE CARD

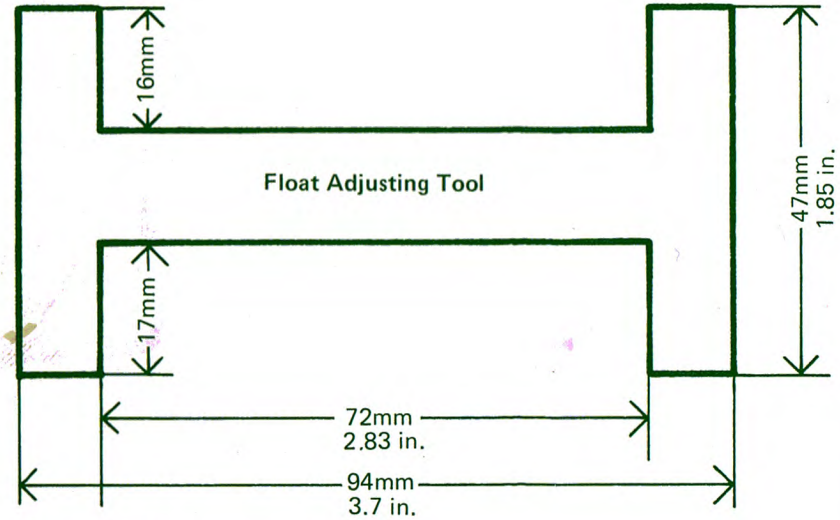
PERFORMANCE MASTERS

1976-1980 Carburetor Specifications:

Model	Year	Carburetor Type	By-Pass Valve	Overrun Valve	Temperature Compensator	Idle/Slowrun Emulsion Circuit	Vent Valve	Choke Type	Gap/Speed
Jaguar XJ-6	1976	175CD2V (2)	Yes	No	Yes	No	Yes	Automatic Bi-Metal	.035 in.
Jaguar XJ-6	1977	175CDSET (2)	Yes	No	Yes	No	Yes	Automatic Bi-Metal	.035 in.
Triumph TR-6	1976	175CD2SEV (2)	Yes	No	Yes	No	Yes	Manual	1100-1300 RPM
Triumph TR-7	1976 (Fed)	175CDSEV (2)	Yes	No	Yes	No	Yes	Manual	1500-1700 RPM
Triumph TR-7	1976 (Calif.)	175CD4TV	Yes	No	No	Yes	Yes	Automatic Bi-Metal	.020 in.
Triumph TR-7	1977-80	175CDFVX (2)	Yes	No	Yes	No	Yes	Automatic Wax Capsule	—
Triumph TR-8	1980	175CDSET (2)	No	Yes	Yes	No	Yes	Automatic Bi-Metal	.027 in.
Triumph Spitfire	1976-80	150CD4T	Yes	No	No	Yes	Yes	Automatic Bi-Metal	.035 in.
MGB	1976-80	175CD5T	No	Yes	No	Yes	Yes	Automatic Bi-Metal	.025 in.
MG Midget	1976-80	150CD4T	Yes	No	No	Yes	Yes	Automatic Bi-Metal	.035 in.

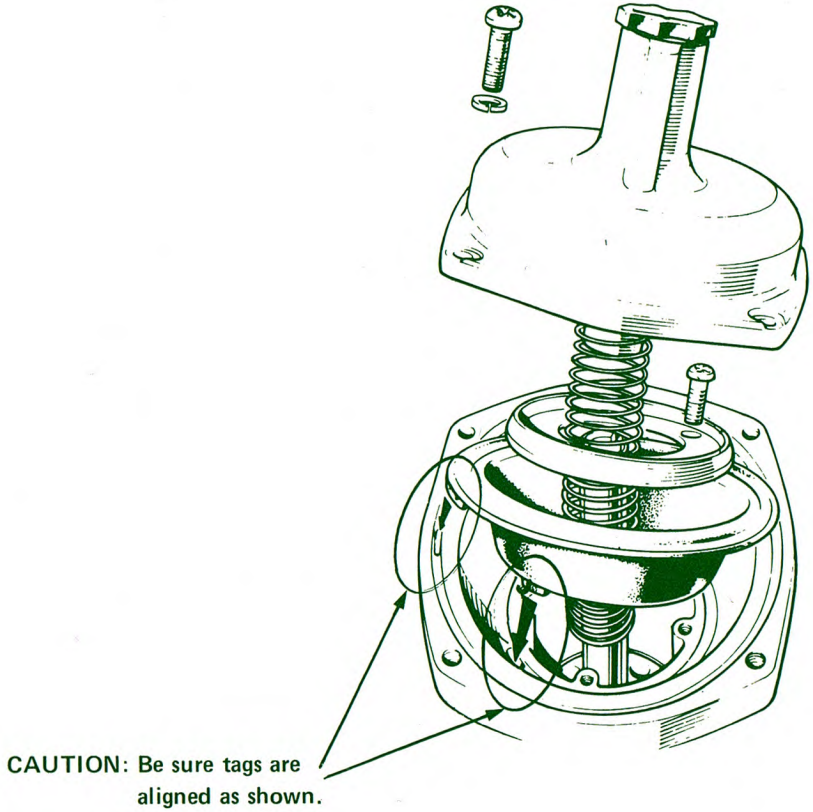
Float Level:





Scale: Full Size
Fabricate from light gauge stock.

Diaphragm Installation:



BRITISH LEYLAND

SERVICE DIVISION

Frontliners Audiovisual Service Technical Information

CARBURETION

CONTENTS

INTRODUCTION

THEORY AND OPERATION 1

ADJUSTMENTS AND TUNING 11

STROMBERG

DAMPER OIL LEVEL 11

BY-PASS VALVE ADJUSTMENT 11

VENT VALVE ADJUSTMENT 12

TUNING 13

FAST IDLE ADJUSTMENT 16

SU

DAMPER OIL LEVEL 17

TUNING 17

FAST IDLE ADJUSTMENT 19

REVIEW QUIZZES 20

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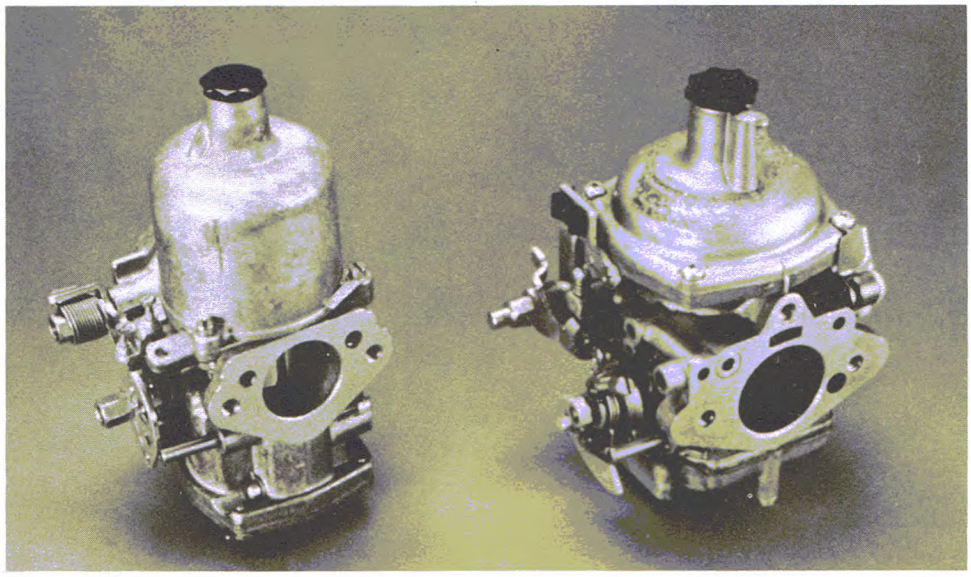
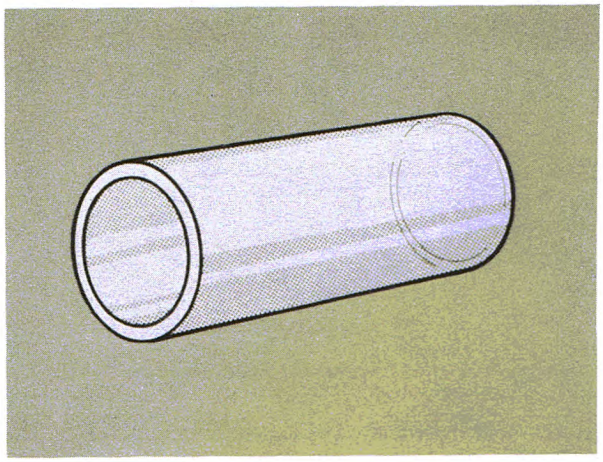
INTRODUCTION

This workbook and the program that accompanies it are to be used as a guide when servicing and tuning BRITISH LEYLAND cars fitted with carburetors. Both the SU and STROMBERG carburetors are covered; however, the theory portion of the program emphasizes the STROMBERG carburetor. The SU and STROMBERG carburetors are similar in operation, therefore the theory diagrams will illustrate STROMBERG carburetors.

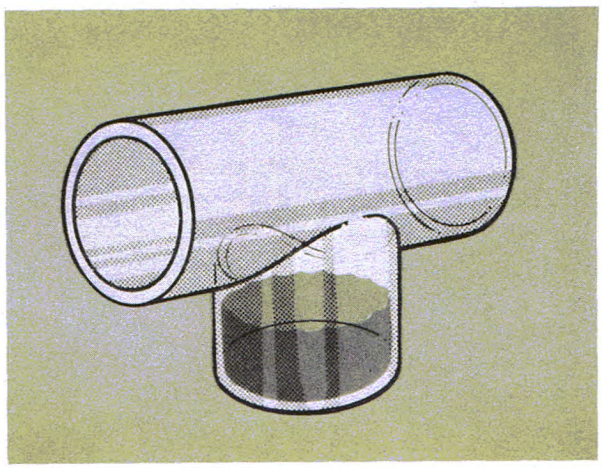
Specifications for carburetor settings are contained in your workshop manuals, training aids and on the emission decal in the car's engine compartment.



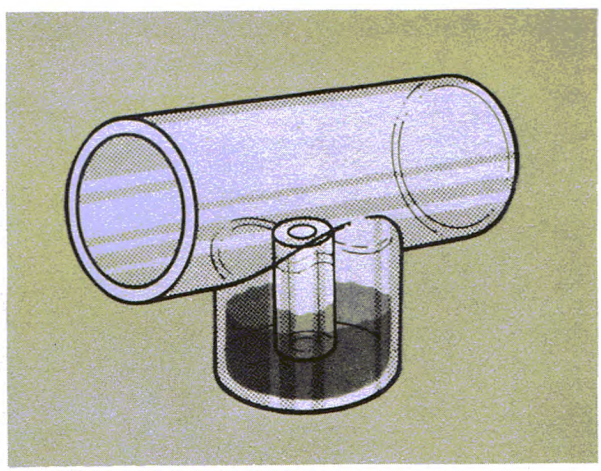
SU STROMBERG



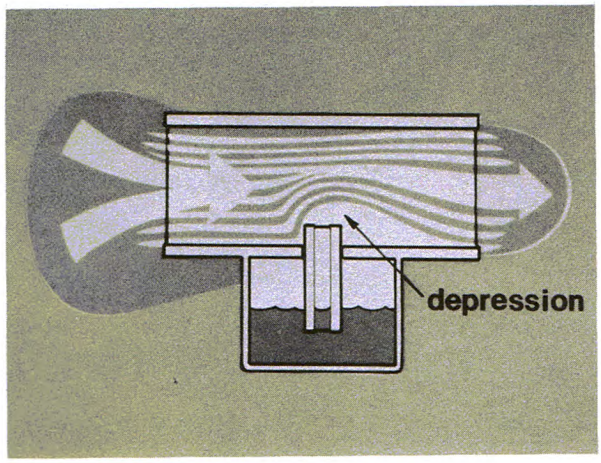
A carburetor has three essential elements: A tube for high velocity air flow called a venturi;



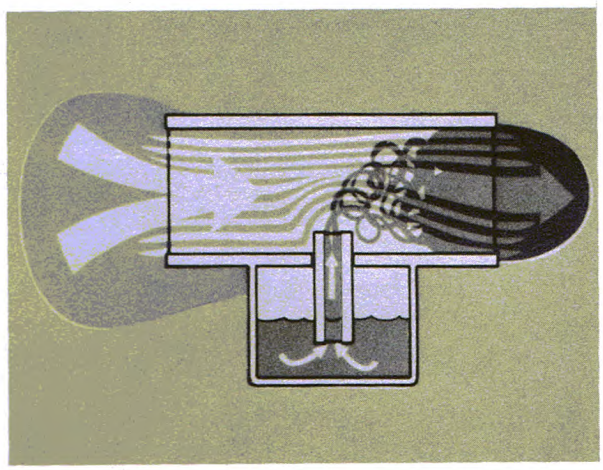
A fuel supply . . . usually in a bowl beneath the venturi;



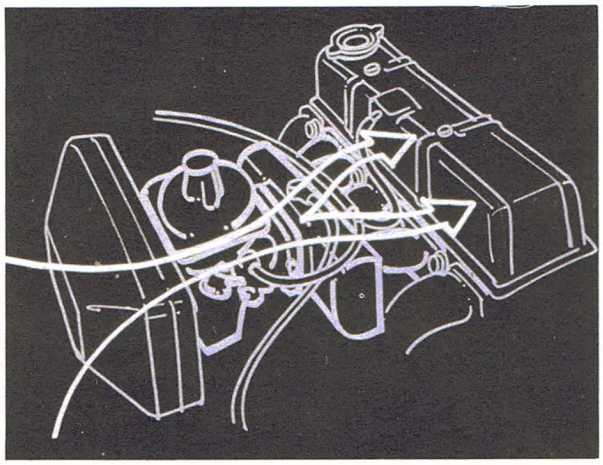
And . . . a small orifice for transferring fuel from the fuel bowl into the venturi. This is generally referred to as a jet.



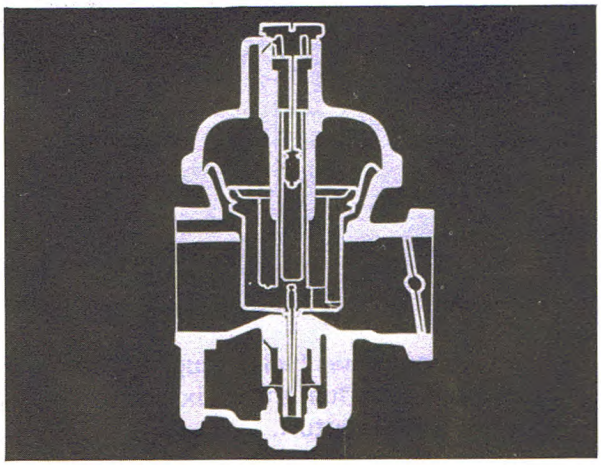
The operation is quite simple. As the engine draws air through the venturi, a low pressure area . . . or depression is created over the jet opening.



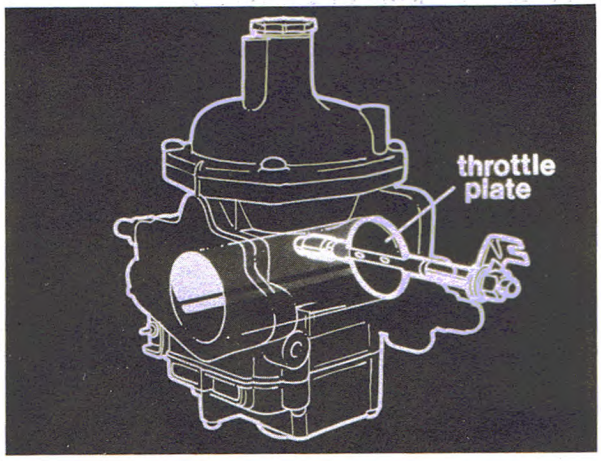
The depression draws fuel through the jet from the fuel bowl. The fuel then mixes with the fast moving air in the venturi.



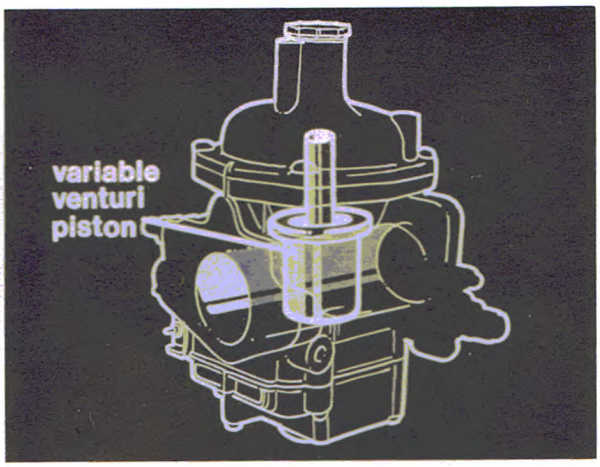
The fuel/air mixture passes into the engine's combustion chamber where it is ignited and burned to produce power. But the type of carburetor we have just illustrated would only be satisfactory if the engine were to run at one speed, however, it would not be suitable for varying engine speeds and loads . . . and would require an external starting aid to start the engine.



Many refinements are necessary to make this basic carburetor suitable for automobile use. All carbureted BLM cars use constant velocity variable venturi carburetors. The refinements for this type of carburetor are as follows:

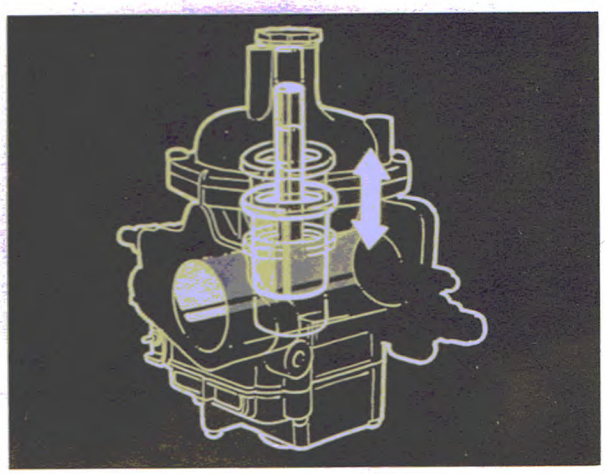


The first necessary refinement is a throttle plate. As the throttle plate is opened and closed, it controls the amount and velocity of air passing through the carburetor.

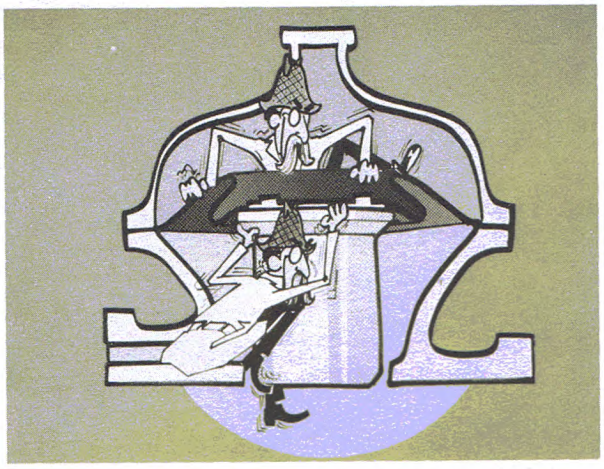


Now, a variable venturi piston is added. The action of the throttle plate controls the position of the piston which varies the venturi size (or opening).

NOTE: THE PISTON IS OFTEN REFERRED TO AS AN AIR VALVE.

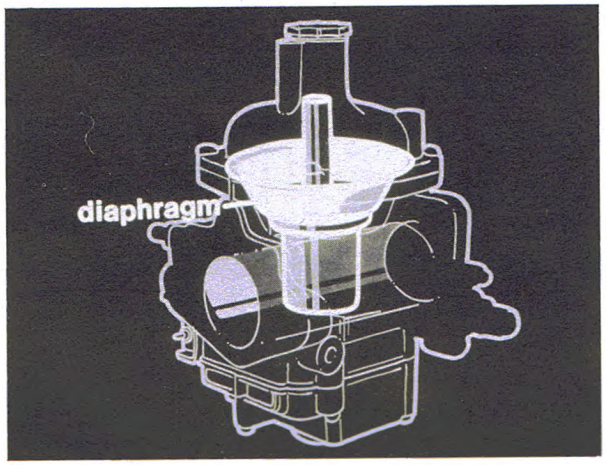


The piston moves up and down to increase or decrease the venturi size.

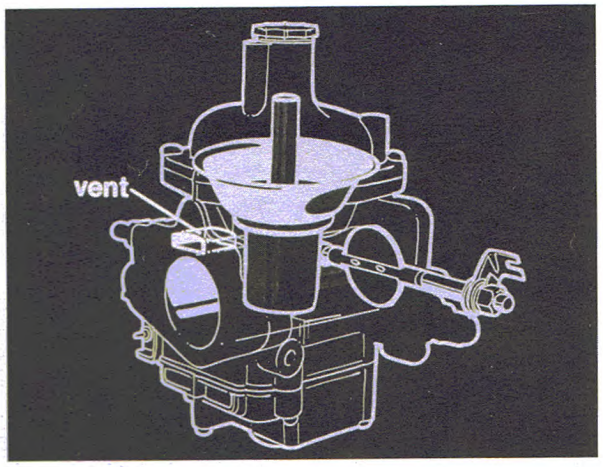


This is accomplished by using the difference in pressure between the atmosphere and the downstream side of the piston.

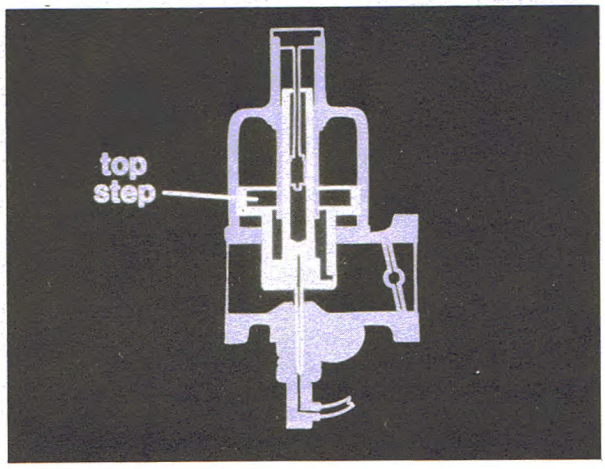
The downstream side of the piston is vented to the top of the piston by two drillings in the piston itself.



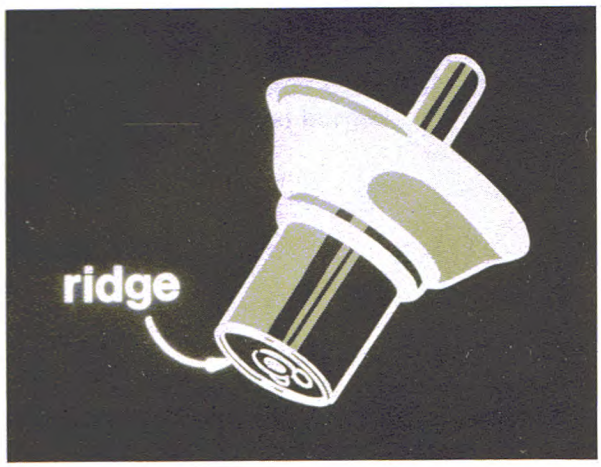
At the top of the piston, atmospheric pressure and the downstream venturi pressure are channeled into separate chambers. In the Stromberg, the chambers are separated by a diaphragm.



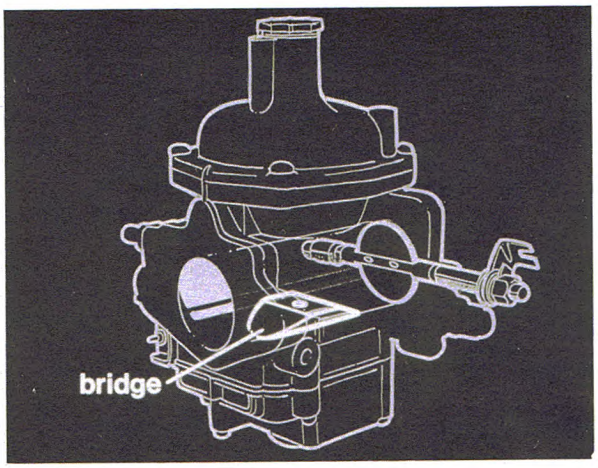
And . . . the underside of the diaphragm or upper piston is vented to the atmosphere through a drilling in the carburetor body.



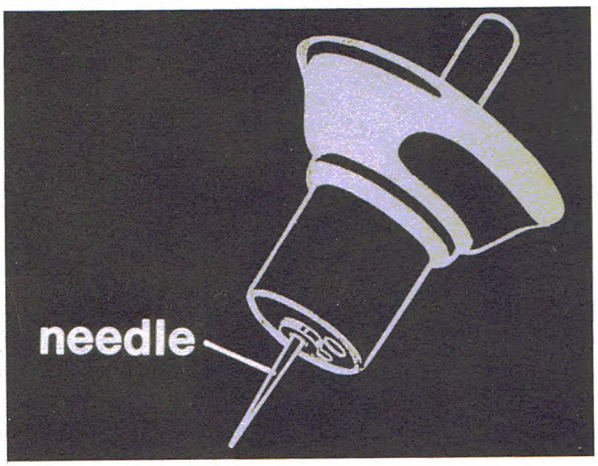
In the SU, they are separated by another step on the piston.



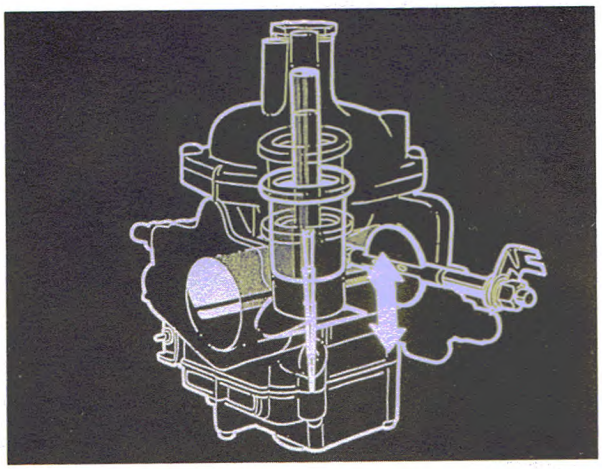
At rest, the piston does not completely cut off the venturi as it is held open by a ridge or pad at the bottom of piston. This allows starting and idling.



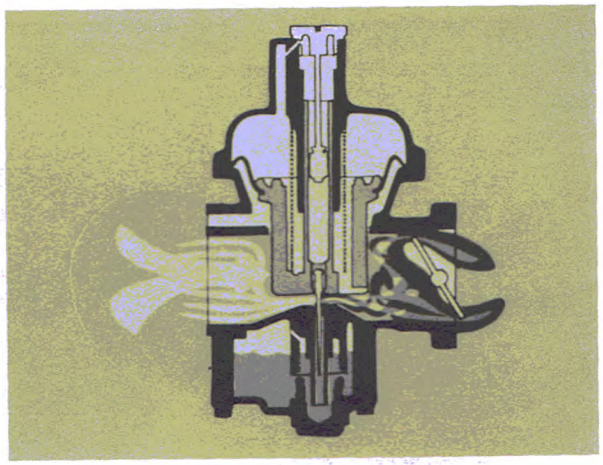
The next refinement is a bridge under the piston which creates turbulence and produces better fuel atomization. It also provides depression at full throttle.



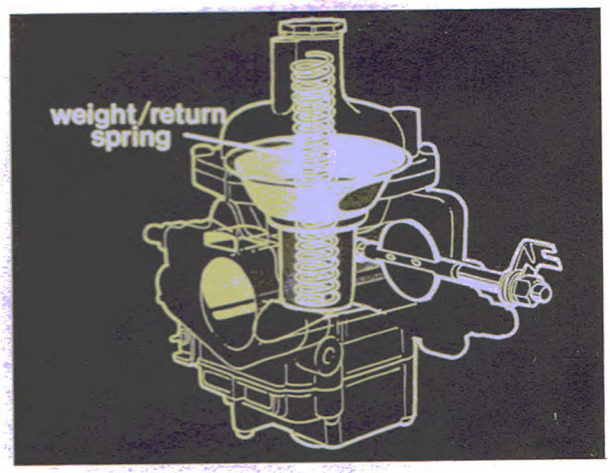
A further refinement is the tapered fuel metering needle. The needle is attached to the piston and moves up and down with it.



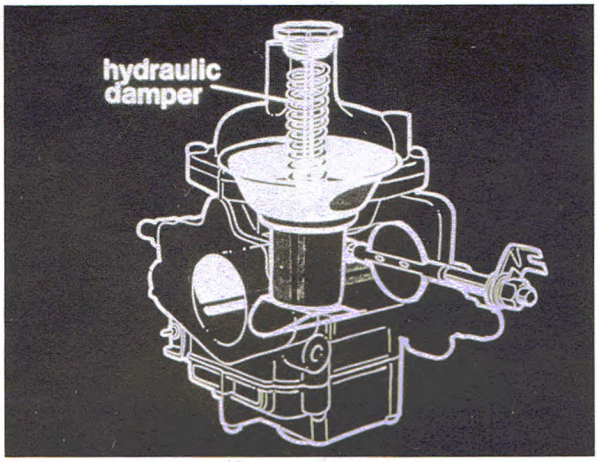
The needle taper varies the jet opening size as the needle moves up and down with the piston. This controls the amount of fuel flowing into the venturi.



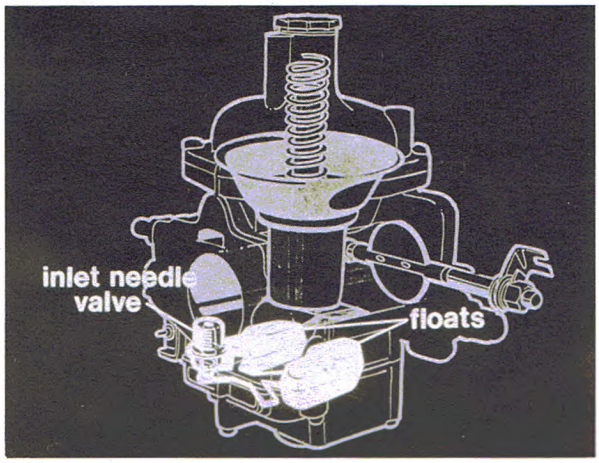
So now we have a way of metering the fuel into the venturi in relationship to the throttle position and the venturi size. This allows very precise response and smooth operation.



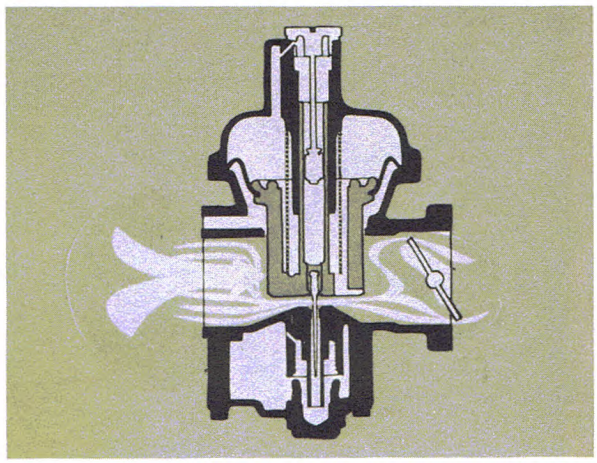
Further refinements to the basic carburetor include: A weight/return spring which helps move the piston down.



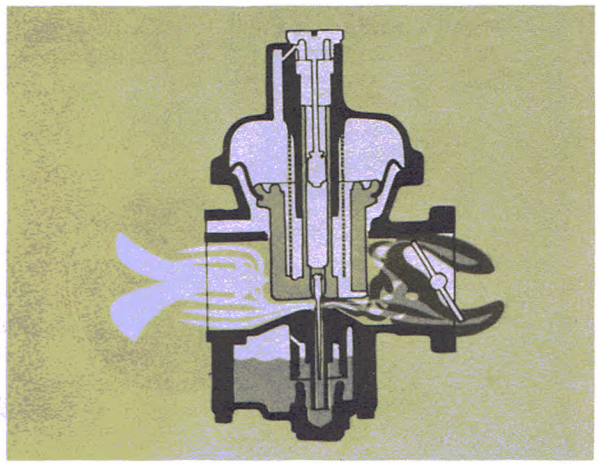
A hydraulic damper which limits the initial piston movement. This provides initial enrichment on acceleration.



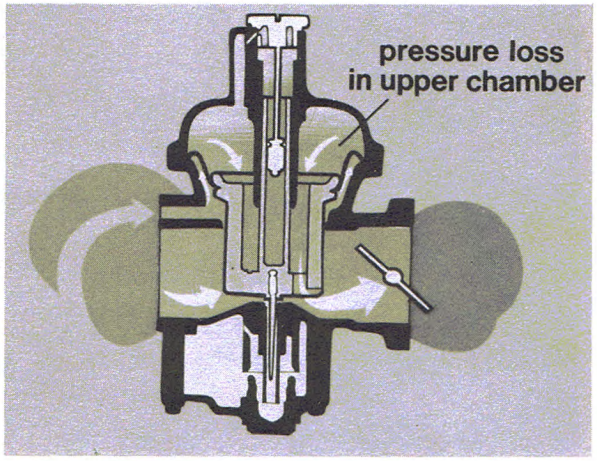
And . . . a float controlled inlet needle valve in the fuel bowl which governs the fuel level. Now we have a carburetor that is suitable for automotive use. So, let's look at how it operates . . . druing idle, cruise and acceleration.



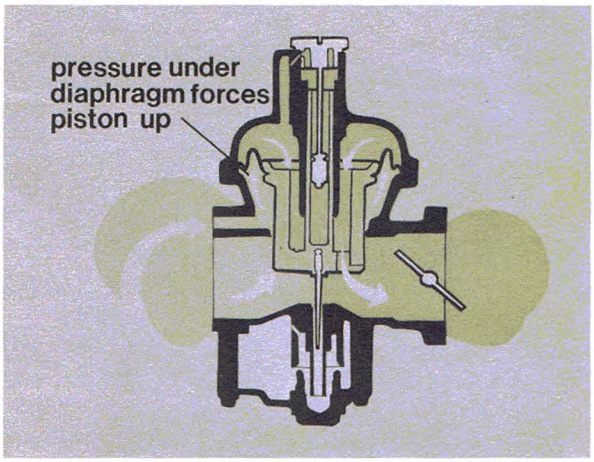
At idle, the throttle plate is partially open and a slight depression is created on the downstream side of the piston. The slight depression is channeled to the upper chamber. However the piston is only partially raised because the difference in pressure is not great enough to overcome the weight of the piston and the spring tension.



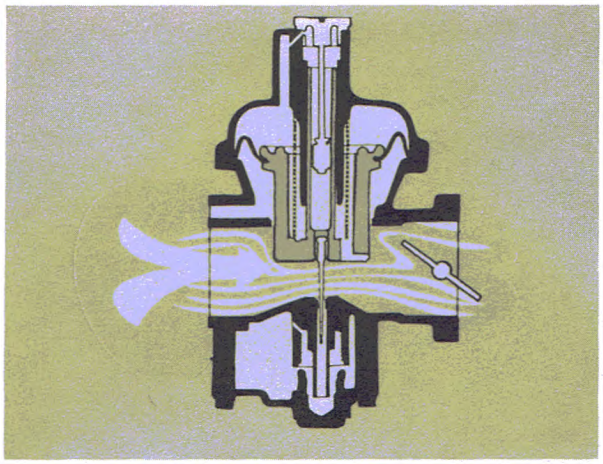
The depression over the jet draws fuel into the venturi from the fuel bowl which atomizes and mixes with the incoming air. The mixture then passes into the engine's combustion chamber where it is ignited and burned.



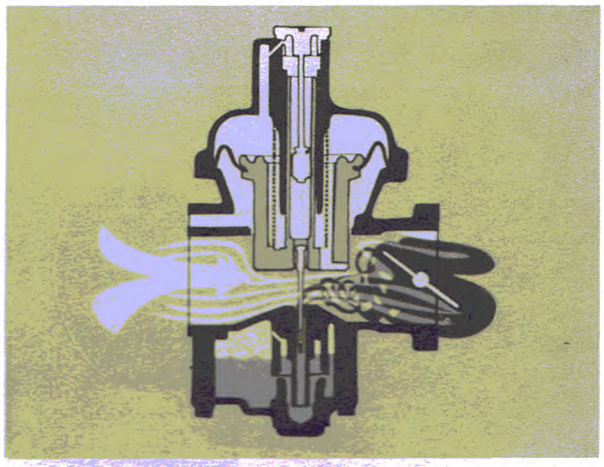
At cruise, the throttle plate is open approximately half way, causing a greater depression on the downstream side of the piston. The depression is channeled to the upper chamber, and this produces a substantial difference in pressure in the two chambers on top of the piston.



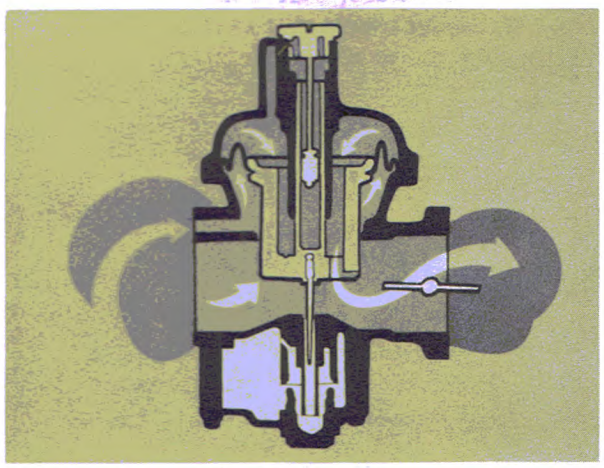
The difference in pressure causes the piston to be raised to a partially open position. This occurs because the atmospheric pressure, acting on the bottom of the diaphragm, is greater than the venturi pressure.



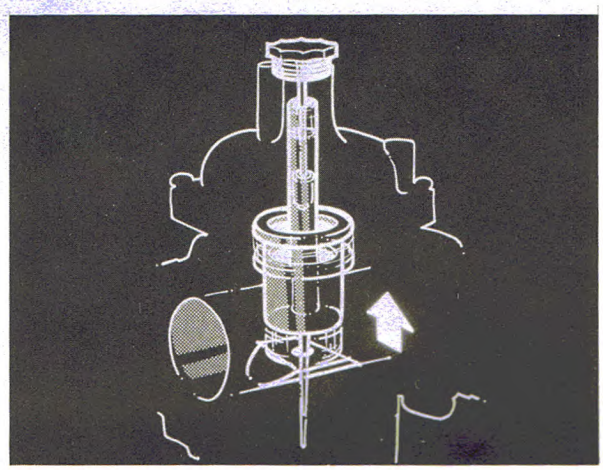
The depression over the jet is greater due to the increased air velocity. And . . . as the metering needle has moved up with the piston, more fuel flows into the venturi.



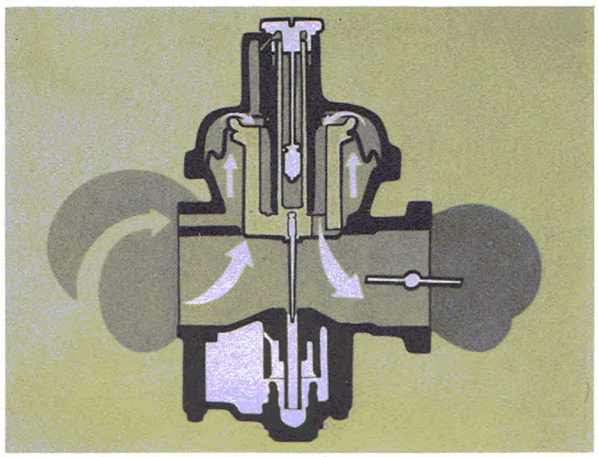
Again . . . the fuel atomizes and mixes with the incoming air. The mixture then passes into the combustion chamber where it is ignited and burned.



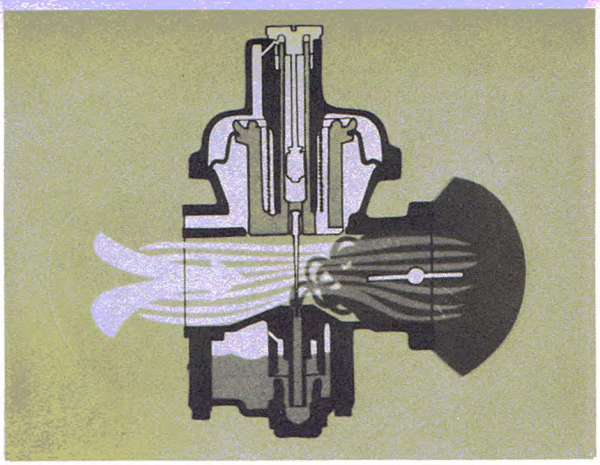
During acceleration, the throttle plate is completely open. This creates an even greater depression in the venturi and the pressure difference in the two chambers is the greatest. Remember, the venturi and atmospheric pressures are channeled to the chambers on top of the piston.



The initial upward movement of the piston is limited by the hydraulic damper. This provides initial mixture enrichment to prevent hesitation.



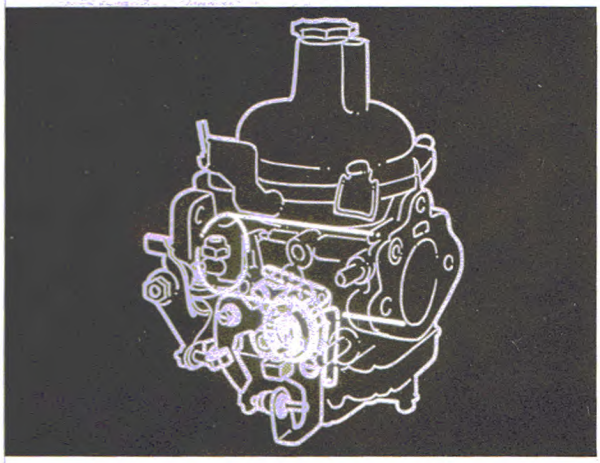
After the initial dampening, the piston gradually raises all the way, opening the venturi to its maximum size, giving a very smooth transition from low speed to high speed.



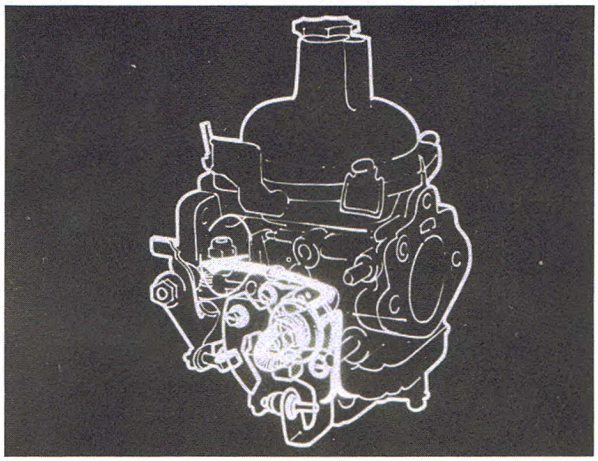
The depression over the jet becomes greater as the piston moves up and the air velocity increases. Also, the metering needle allows more and more fuel to enter the venturi as it raises with the piston. When the piston is raised all the way (open), the needle allows maximum fuel flow and the piston allows maximum air flow. The mixture passes onto the combustion chamber where it is ignited and burned producing maximum power.

You can see that the relatively simple constant velocity-variable venturi carburetor provides excellent response and control over all engine operating modes.

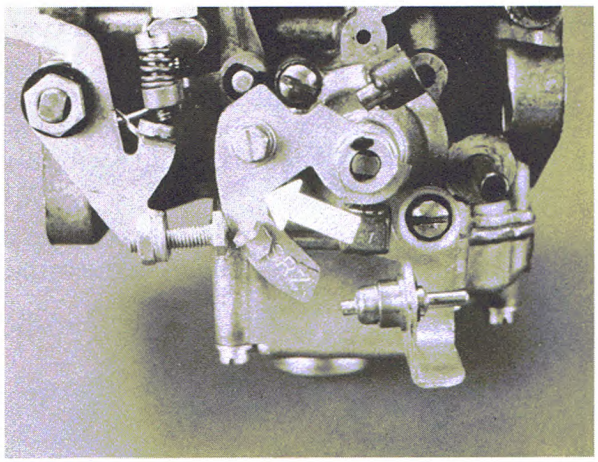
Because of the requirements of cold starting, additional controls have been added to the carburetor.



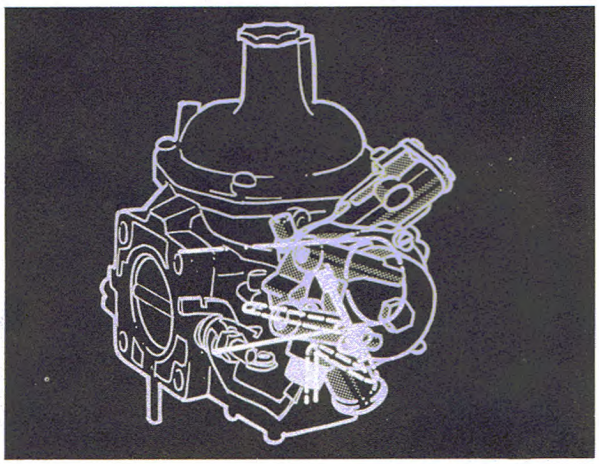
Some versions of the Stromberg carburetor use a manual choke to aid in cold starting. A separate channel is made between the fuel bowl and the low depression area of the carburetor. A disc with a series of drillings is positioned to control flow in the channel.



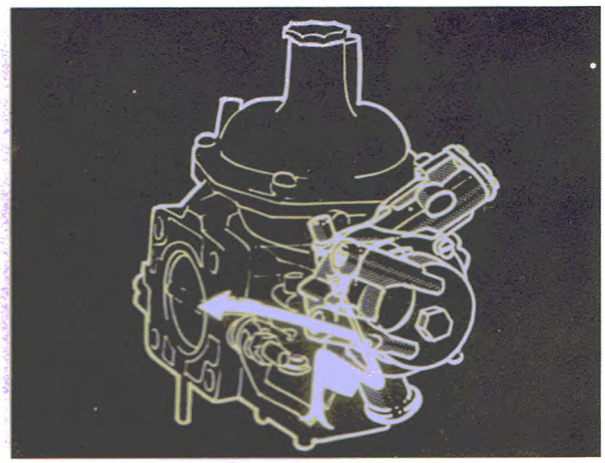
The disc, which is manually controlled by a cable, rotates to allow fuel flow directly into the low depression area. With the choke off, the disc is in a position which prevents fuel flow.



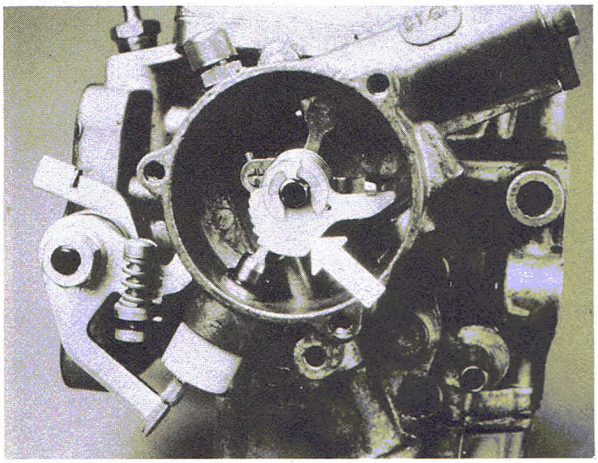
Besides mixture enrichment, the choke cable also controls the carburetor fast idle cam. This provides increased engine RPM during warmup.



Other versions of the carburetor use an automatic choke, which also has a separate channel from the fuel bowl to the low depression area of the carburetor. However, fuel flow is controlled by a jet and needle. The jet is in turn controlled by a bi-metal strip.

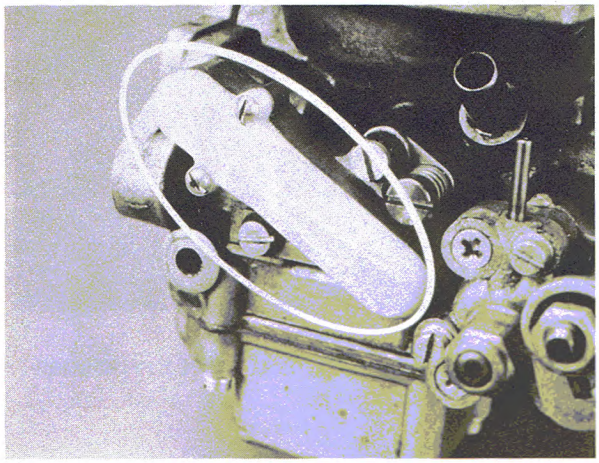


The needle moves to meter fuel into the carburetor with changes in engine coolant temperature. A bi-metal spring attached to the needle senses coolant temperature. When the temperature is low, full fuel flow is allowed. As the engine warms up, fuel flow is gradually decreased by movement of the spring and the needle. When the engine is completely warmed up, the fuel flow is cut off.

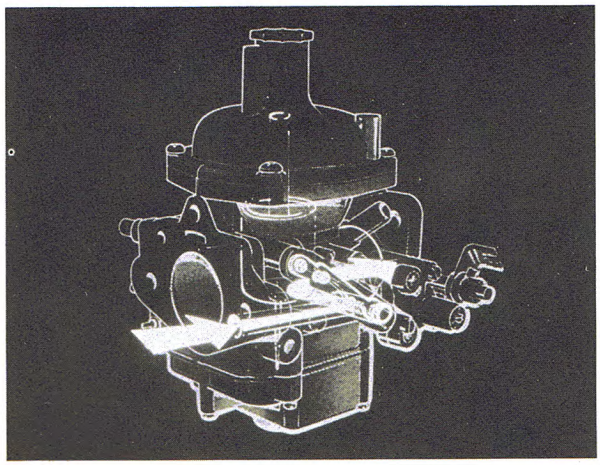


Fast idle is provided by a stepped cam and an adjusting screw. The cam and bi-metal spring use the same pivot.

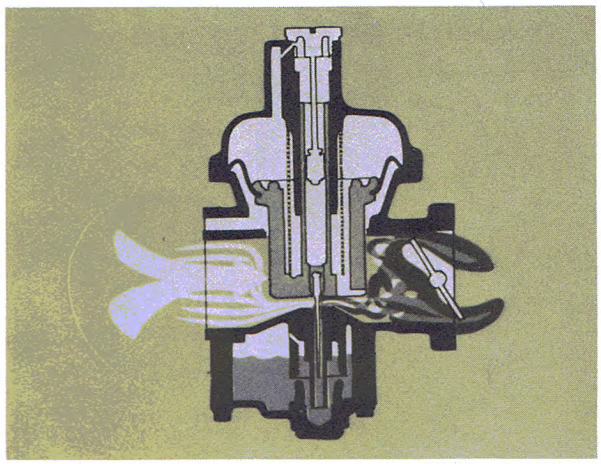
To help control emissions, several devices have been added to the carburetor.



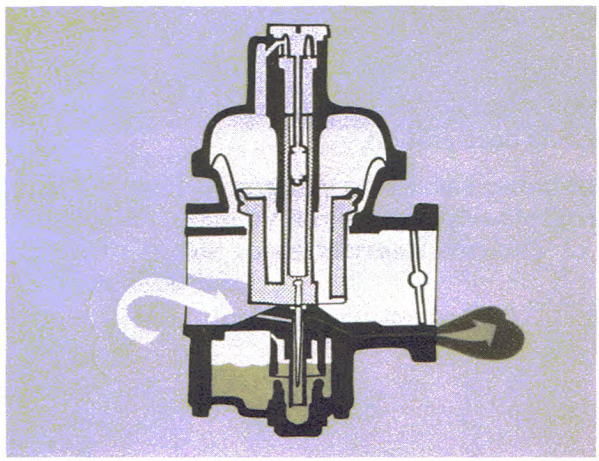
A temperature compensator helps reduce emissions at hot idle by creating a leaner mixture.



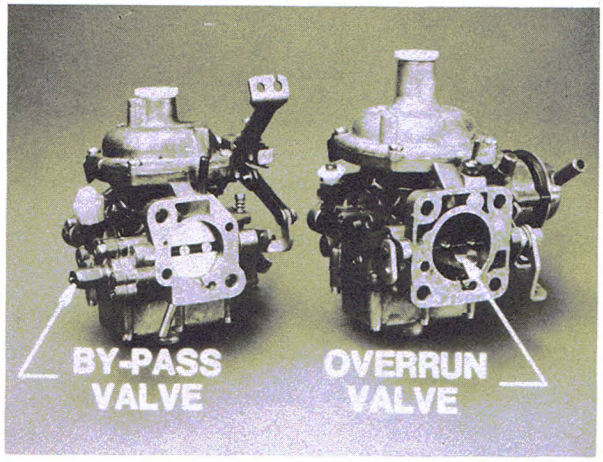
At operating temperature, a tapered valve controlled by a bi-metal strip allows air to bypass the bridge and enter the carburetor in the low depression area.



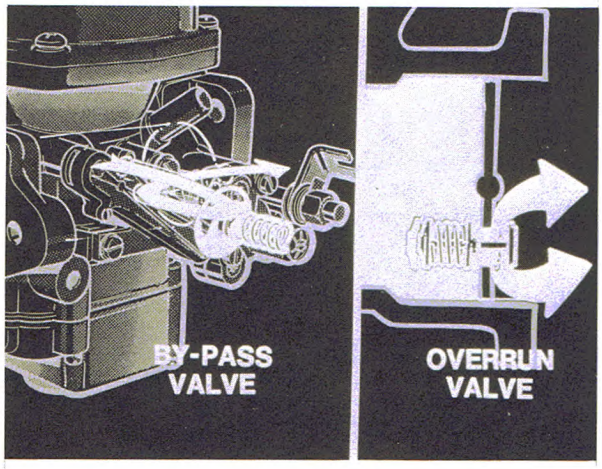
This weakens the depression and the piston falls slightly. The fuel supply is reduced by the lowering of the needle and this creates a leaner mixture.



In some versions, an idle/slow run emulsion circuit replaces the temperature compensator. This is a separate circuit which discharges its mixture downstream of the throttle plate.

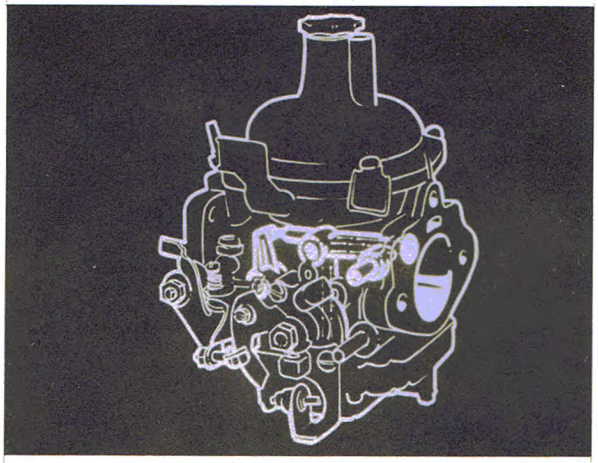


All carburetors are now fitted with a bypass valve or an overrun valve to reduce emissions on deceleration.

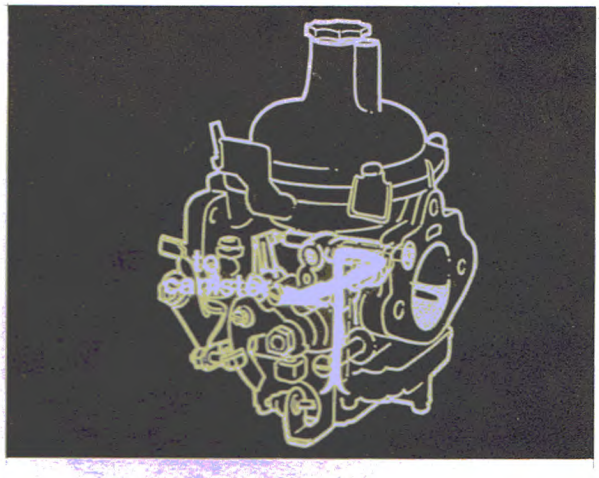


These one way, spring loaded valves, allow the mixture to bypass the throttle plate when the throttle plate is suddenly closed. The high manifold vacuum present at this time, unseats the valve and allows the mixture to flow directly into the combustion chamber.

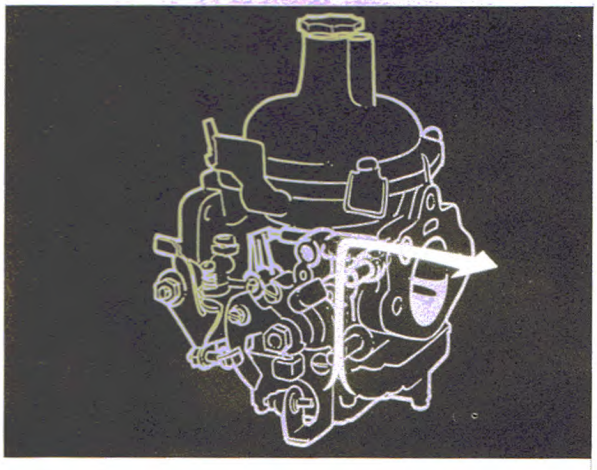
This prevents fuel residue in the intake manifold from passing through the engine in a raw state during deceleration.



Another emission reducing device found on some versions is a vent valve. The vent valve controls the fuel bowl venting, which, in turn, is controlled by the throttle position.



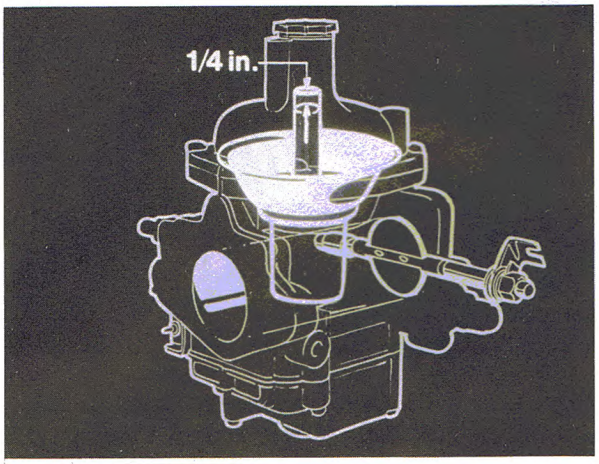
The vent valve vents the fuel bowl to the charcoal canister during idle.



And . . . to the air filter housing when the throttle is opened.

STROMBERG DAMPER OIL LEVEL

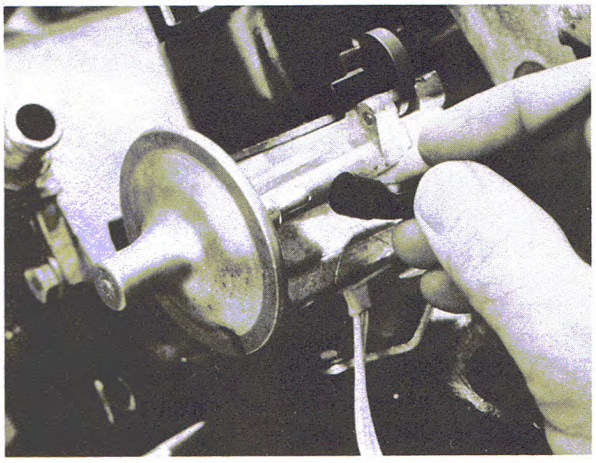
The piston damper oil level should be checked at each service interval and after performing a mixture needle adjustment.



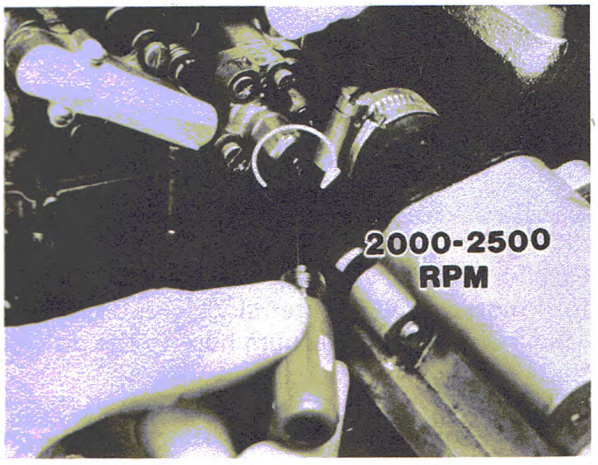
Remove the damper assembly from the top of the carburetor. Raise the piston with your finger through the carburetor opening. With the piston raised all the way, top up the damper tube with engine oil until the level is ¼ inch from the top of the tube. Then, re-install the damper assembly. Again, raise the piston all the way. This will enable you to position the oil retaining clip during installation.

STROMBERG BYPASS VALVE ADJUSTMENT

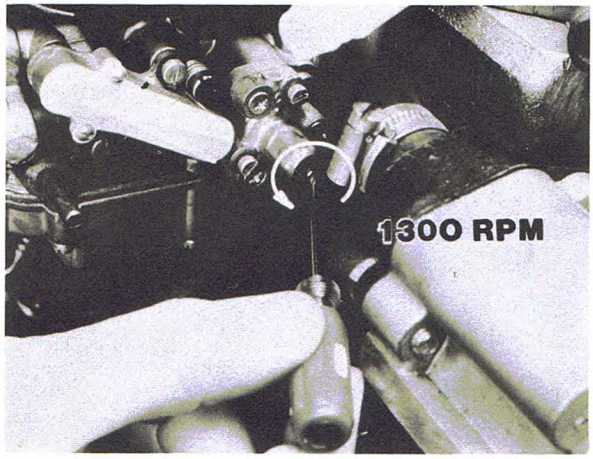
During tune-up, the bypass valve operation should be checked, and adjusted if necessary.



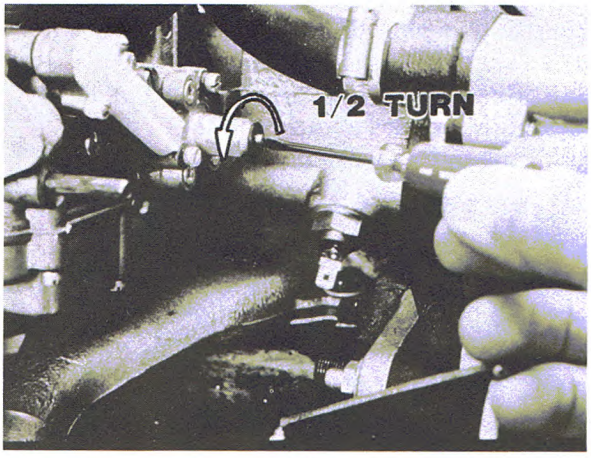
Bring the engine to normal operating temperature, then remove the vacuum hose from the distributor and plug the hose. If the valve is adjusted correctly, the engine speed will rise to 1300 RPM. If the engine speed is greater than 1300 RPM or rises abruptly to 2000 to 2500 RPM, the bypass valve needs adjustment.



If adjustment is necessary on a single carburetor installation, begin by turning the valve clockwise until the engine speed increases abruptly to 2000 to 2500 RPM.



Then, turn the valve adjusting screw counter clockwise until the engine speed returns to 1300 RPM. Now, open and close the throttle. The engine speed should drop to approximately 1300 RPM when the throttle is closed. Adjust as necessary to achieve this condition.

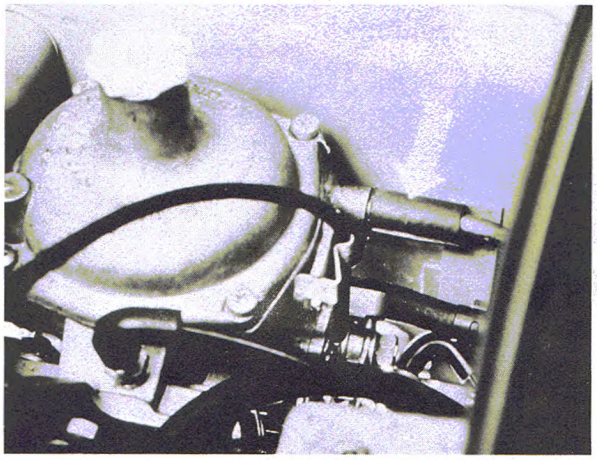


Finally, turn the valve adjusting screw one half turn more in the counter clockwise direction. Then reconnect the vacuum hose to the distributor.

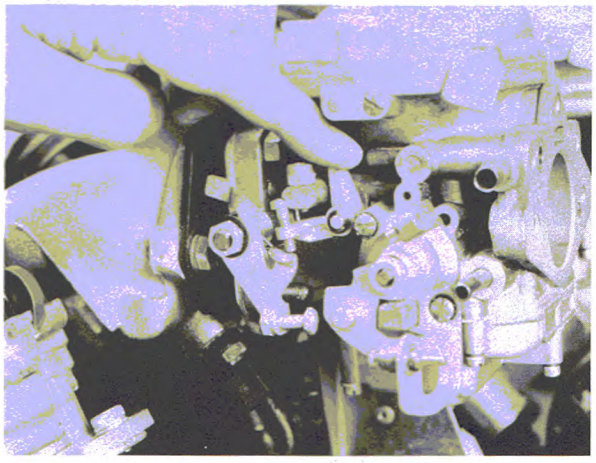
On cars equipped with twin carburetors, the procedure is the same; but, first shut off completely one bypass valve by turning the valve adjusting screw fully counter clockwise. This will prevent erroneous readings while making the initial check and adjustment.

STROMBERG VENT VALVE ADJUSTMENT

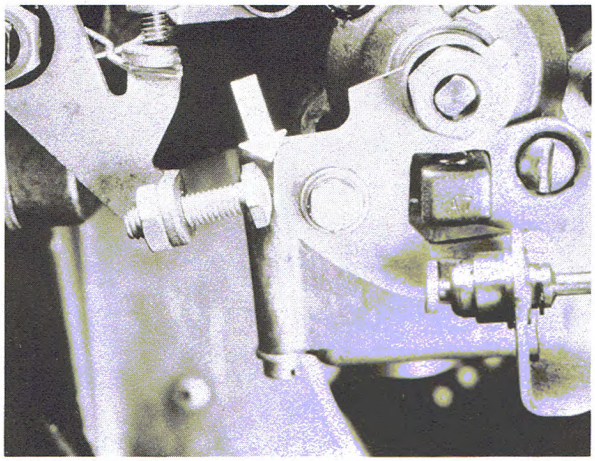
For the limited number of carburetors fitted with a vent valve, the adjustment is as follows:



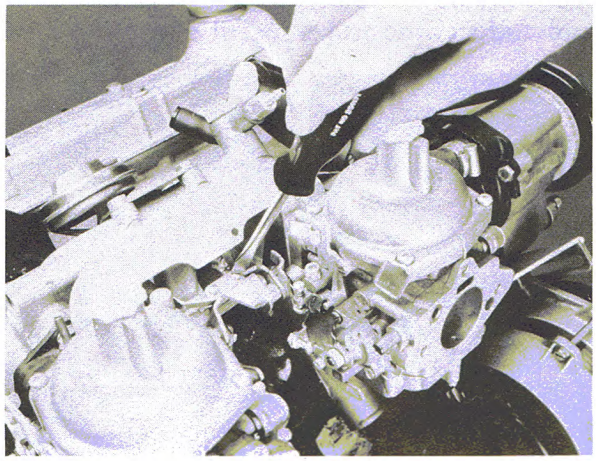
Ensure that the engine idle speed is set to the correct specification. Then, stop the engine, and remove the existing vent valve hose from the carburetor. Attach a separate piece of hose to the vent valve tube on the carburetor.



Now, blow into the hose and at the same time move the lever that operates the vent valve. As the lever is operated, a sudden restriction will be felt while blowing into the tube. This will allow you to feel the valve operation.



Release the lever and allow the mechanism to return to the idle position.



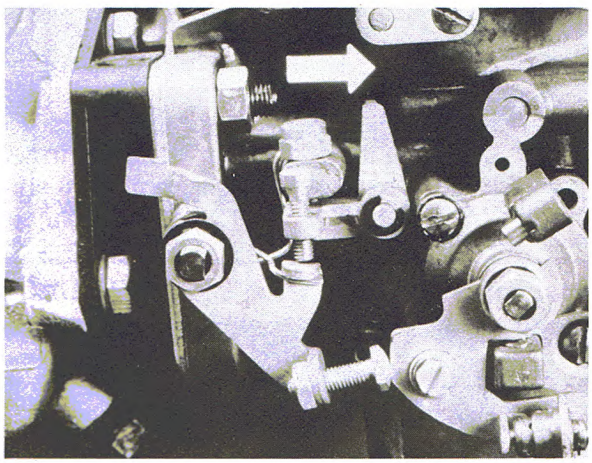
Blow into the hose again. If no restriction is felt, the vent valve is adjusted correctly. If a restriction is felt, turn the adjusting screw counter clockwise until the restriction just disappears. This is the correct setting.

If twin carburetors are fitted, repeat the procedure for the other carburetor. When the adjustments are complete, remove the auxiliary hose and re-fit the vent hose.

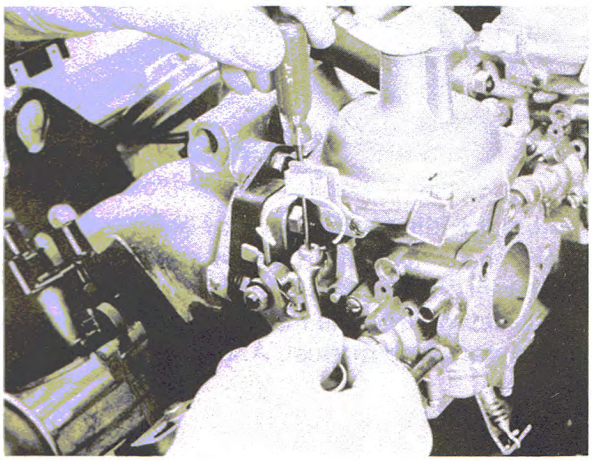
STROMBERG TUNING

During carburetor tune-up, do not allow the engine to idle for longer than three minutes without clearing out the system by holding the throttle at 2000 RPM for one minute.

First, we make the idle adjustments. Bring the engine up to normal operating temperature, and remove the air cleaner.

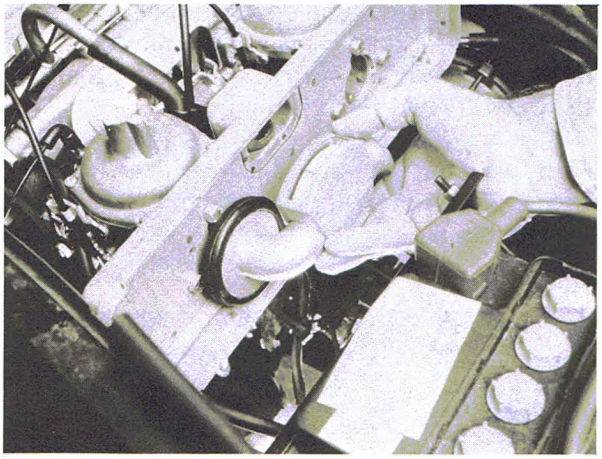


Be sure the choke is off and the fast idle cam is not in contact with the adjustment screw.

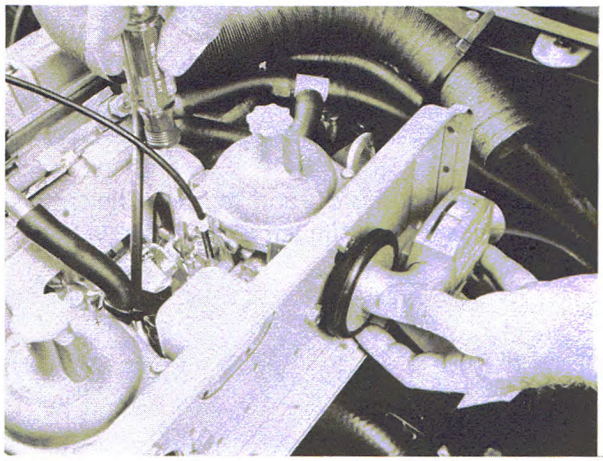


On twin carburetor installations, disconnect, slacken, or adjust the interconnecting links. Refer to the appropriate workshop manual for the specific procedure.

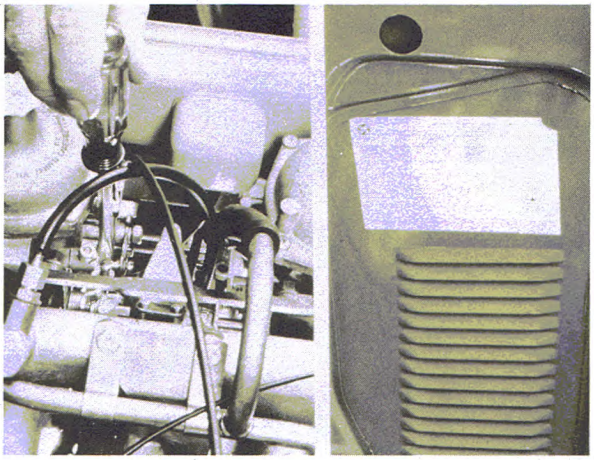
ADJUSTMENTS AND TUNING



Using an air flow meter, check the air flow of each carburetor.

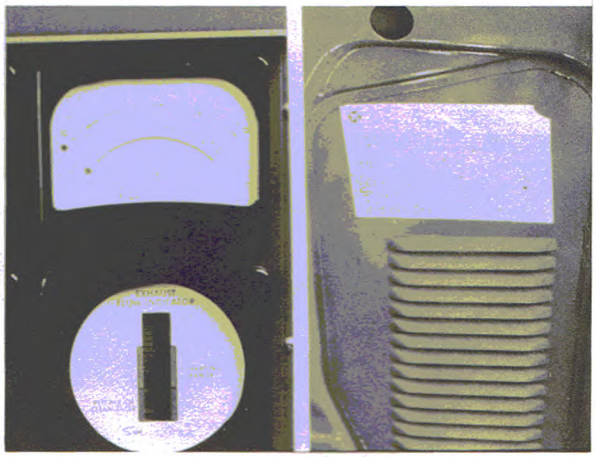


Adjust the idle speed screws of both carburetors until the air flow and RPM are equal. Then, tighten or further adjust the interconnecting links according to the instructions in the appropriate workshop manual. And . . . recheck the air flow.



Now, set the idle speed to specification. If, twin carburetors are fitted, turn both adjusting screws in equal amounts and check the air flow to ensure balance.

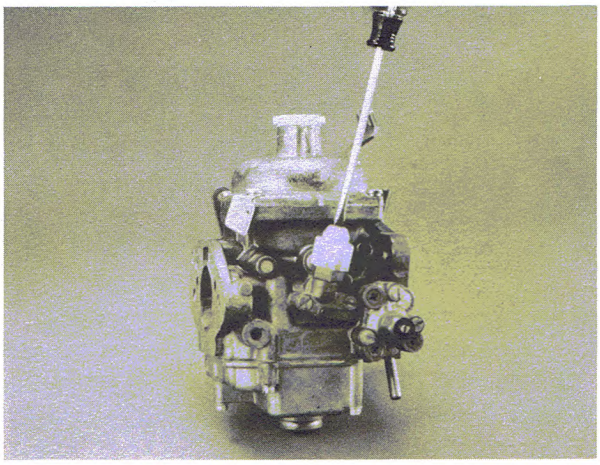
Refit the air cleaner.



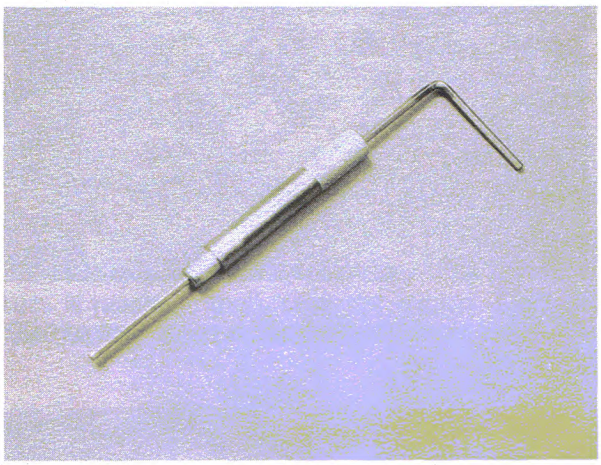
Next using an approved infra-red analyzer, check the CO at idle level against that listed on the emission decal. Be sure to disconnect and plug the manifold side of the air pump hose where applicable. Do not restrict the air pump.

ADJUSTMENTS AND TUNING

If the reading is not within specification, adjust the mixture as follows:

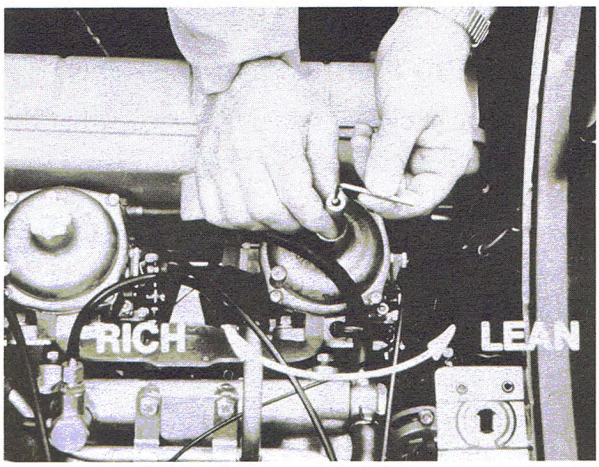


First, adjust the fine mixture trim screw. If twin carburetors are fitted, adjust both carburetors in equal amounts.



If adjusting the trim screw does not bring the CO level into specification, adjust the mixture needle. This requires a special tool.

With the engine operating at idle, remove the carburetor piston damper.



Slowly insert the special tool into the dashpot until the outer tool engages the air valve and . . . the inner tool engages the hexagon in the needle adjuster plug.

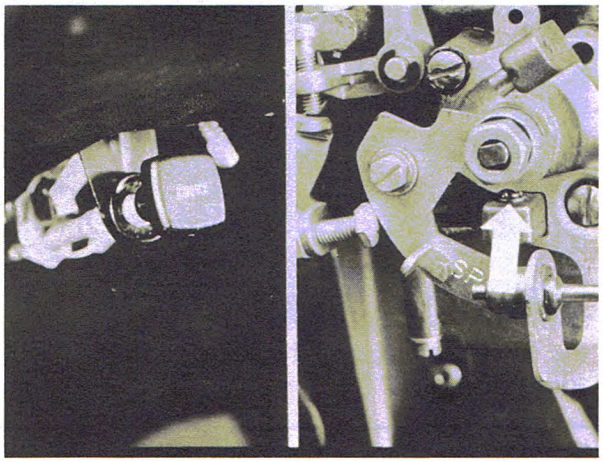
> CAUTION: The outer tool must be correctly engaged and held to prevent damage to the diaphragm.

Hold the outer tool firmly, and turn the inner tool in small increments. Clockwise for a richer mixture, counter clockwise for a leaner mixture. If twin carburetors are fitted, adjust each carburetor in equal amounts.
When the correct CO level is obtained, reinstall the piston damper. After the engine is shut off, position the oil retaining clip and re-check the damper oil level as shown preveously. Also, re-check the idle speed and the CO level. Hold the engine speed at 2000 RPM for one minute before re-checking the CO level at idle.

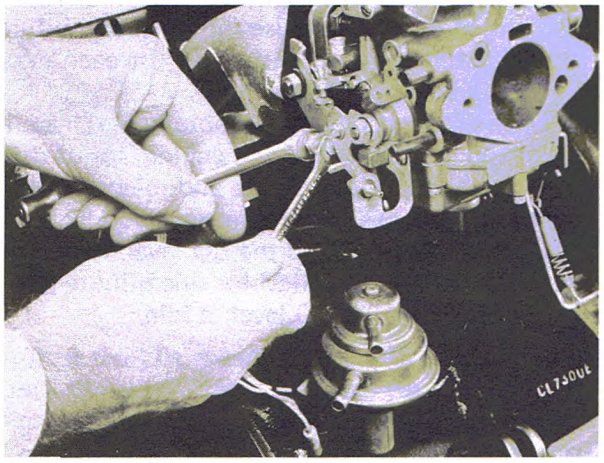
ADJUSTMENTS AND TUNING

STROMBERG FAST IDLE ADJUSTMENT

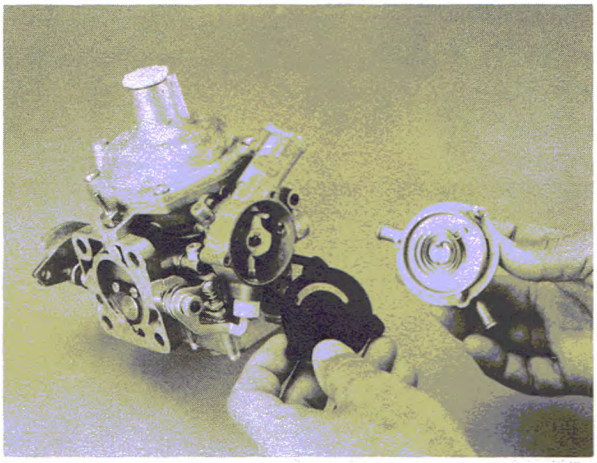
For manual choke versions, first ensure that the misture control cable has free movement.



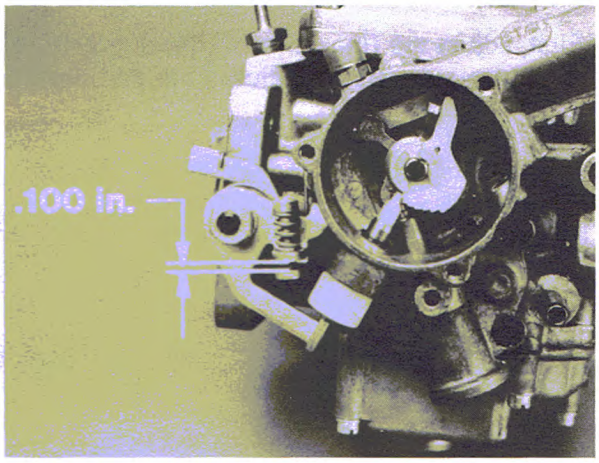
Then pull out the misture control knob on the panel approximately ¼ inch until the fast idle cams are correctly engaged with the ball locaters.



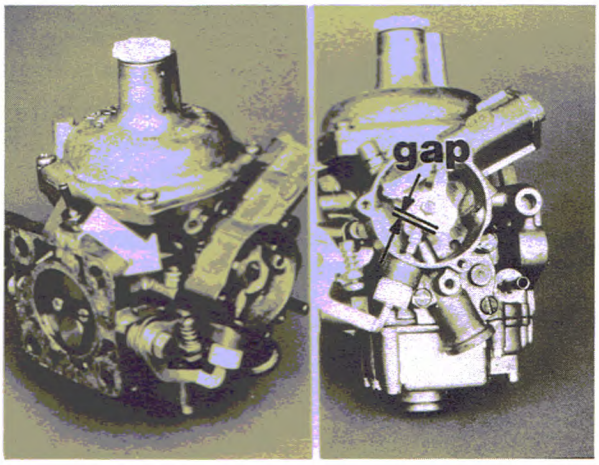
Adjust the fast idle screw and lock nut to specification. On twin carburetor installations, ensure equal air flow through each carburetor.



On automatic choke versions, remove the carburetors, then remove water jacket, gasket, sealing ring, and the heat mass and the insulator from the choke unit.



Then, set the linkage gap to a minimum of 100".



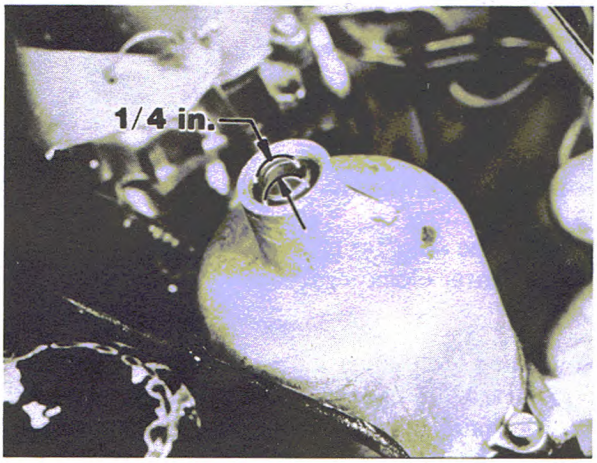
Now, turn the adjusting screw until the gap between the throttle stop and the cam is as specified. The specification can be found in your workshop manual or training aid.

After adjustment, re-assemble the components and refit the carburetors.

ADJUSTMENTS AND TUNING

SU DAMPER OIL LEVEL

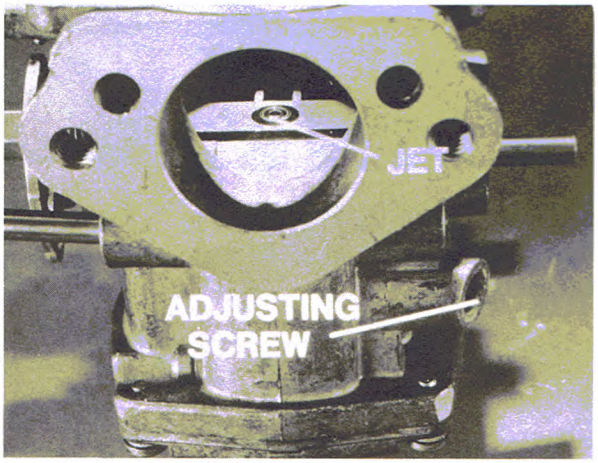
Remove the air cleaners and check the piston damper oil level. Do this, by first removing the damper assembly from the top of the carburetor.



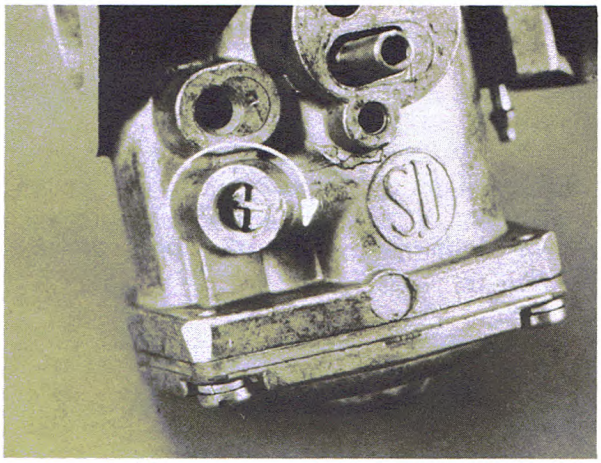
Raise the piston with your finger through the carburetor opening. With the piston raised all the way, top up the damper tube with engine oil until the level is ¼ inch from the top of the tube. Then, reinstall the damper assembly.

SU TUNING

Run the engine until normal operating temperature is reached; then, stop the engine. Slacken the throttle interconnecting shaft clamp bolts.

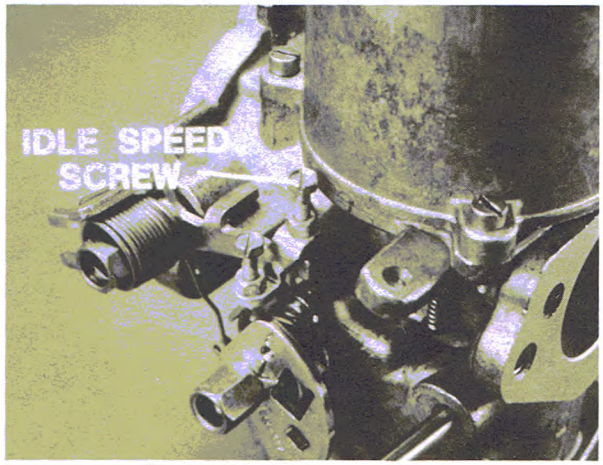


Turn the jet adjusting nut or screw on each carburetor counter clockwise until the jet is flush with the bridge.

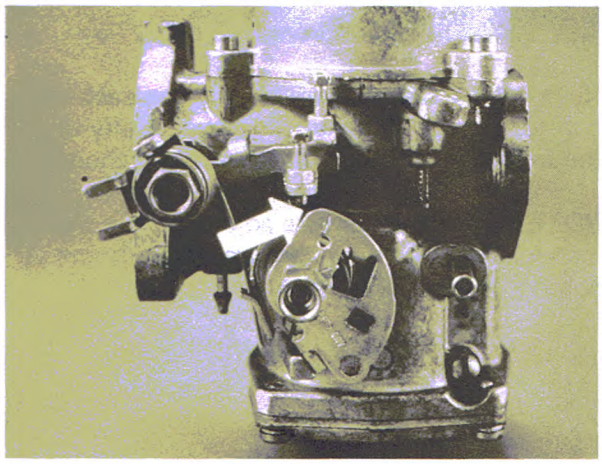


Now, turn each jet adjusting nut or screw clockwise the specified number of turns to obtain the basic mixture setting. Your workshop manual and training aid has the specification.

NOTE: On some models, the restrictor tags must be released.



Next, slacken each idle speed screw until it just clears the throttle lever; then, turn each screw clockwise two turns to obtain a basic setting.

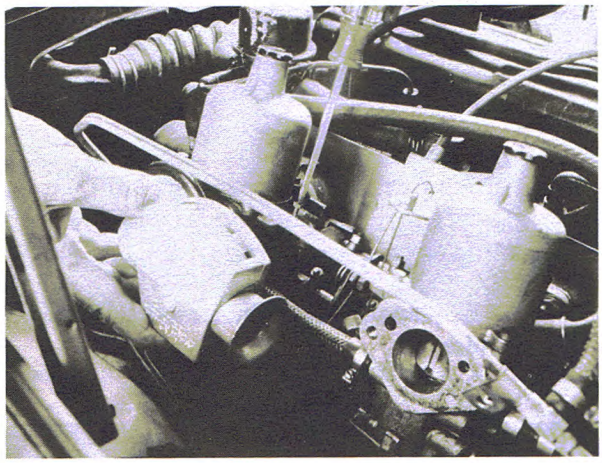


Ensure that the choke is fully off and that the fast idle screws are clear of the cams.

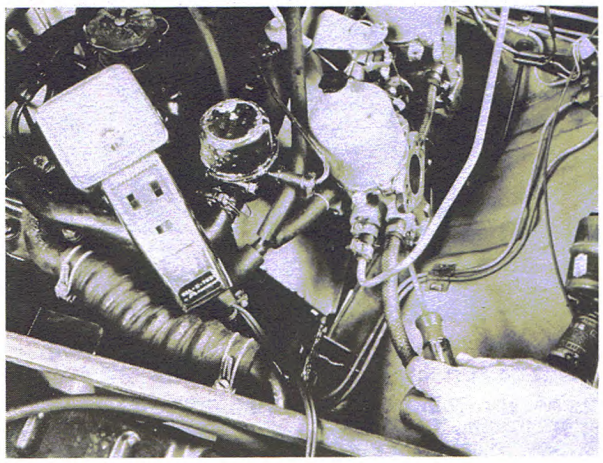
ADJUSTMENTS AND TUNING

Connect an accurate tachometer, and start the engine.

NOTE: Do not allow the engine to idle for longer than three minutes without clearing out the system by holding the throttle at 2500 RPM for one minute.

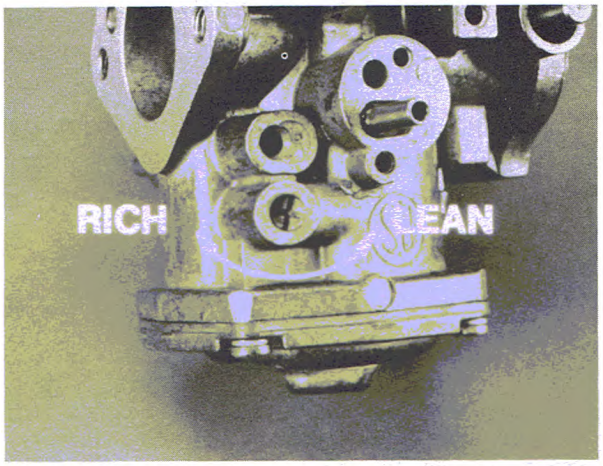


Using the air flow meter, adjust each carburetor idle speed screw until the specified idle speed is reached with the carburetors in balance.



Next, adjust the mixture by turning each carburetor jet adjusting nut or screw equally until the fastest speed is indicated on the tachometer.

NOTE: Turn the mixture adjustment in small increments. ¼ turn for carburetors with screws; one flat for carburetors with nuts.

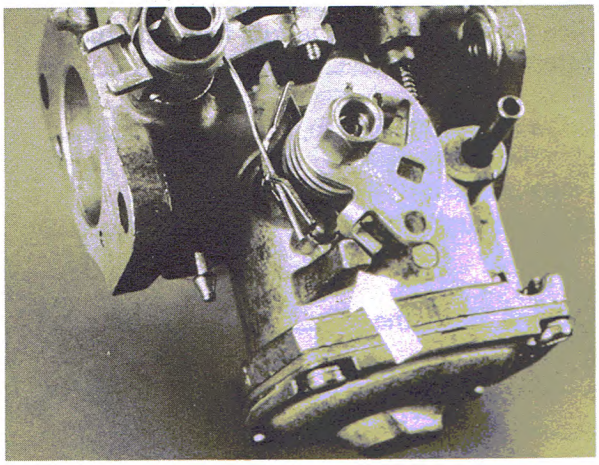


Turning the adjuster clockwise enriches the mixture; counter clockwise leans the mixture.

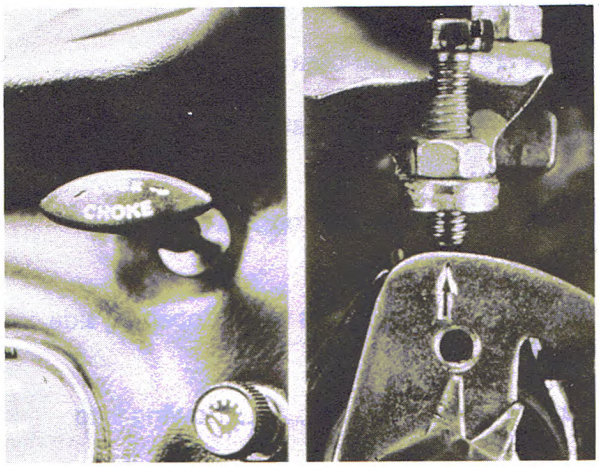
Now, turn each adjusting nut or screw counter clockwise equally until the engine speed just starts to fall. Then, enrich each adjusting screw or nut just enough to regain the maximum engine speed. Re-check the carburetor balance with the air flow meter; then, tighten the clamp bolts on the throttle interconnecting shaft. Raise the throttle to 1500 RPM and again check for correct balance with the air flow meter. Then, refit the air cleaner. Finally, check the CO level with an infra-red tester. If necessary, re-adjust the mixture in small increments to obtain the correct level.

SU FAST IDLE ADJUSTMENT

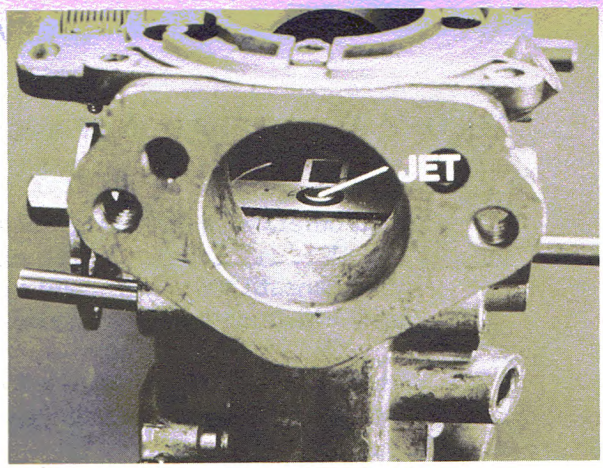
To adjust the fast idle on SU carburetors, proceed as follows:



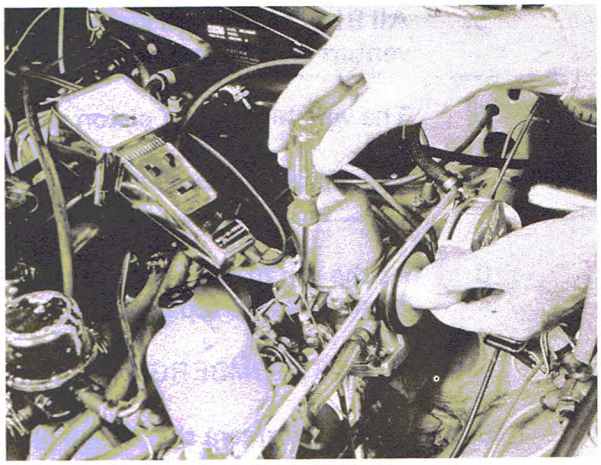
First, be sure the fast idle cams of each carburetor are against their return stops, and that the choke cable has 1/16 inch free play. Remove the air cleaners.



Then, pull out the choke control until the arrow marked on the fast idle cam sligns with the fast idle screw.



On some versions, the choke control is pulled out until the jet just begins to drop.



Adjust each fast idle screw to obtain the specified fast idle speed. Use the air flow meter to ensure balance; then re-fit the air cleaners.

REVIEW QUIZZES

THEORY AND OPERATION (Fill in the blanks)

1. A carburetor has three essential elements: a tube for high velocity air flow called a _____; a _____ _____, usually in a bowl beneath the venturi; and a small orifice for transferring the fuel from the fuel bowl into the venturi. This is generally referred to as a _____.

2. As the engine draws air through the venturi, a low pressure area, or _____ is created over the jet opening.

3. The depression draws _____ through the jet from the _____ _____.

4. The fuel _____ with fast moving air in the _____.

5. All BLM carbureted cars use _____ _____ variable venturi carburetors.

6. The variable venturi piston varies the _____ size.

7. The piston movement is accomplished by using the difference in pressure between the _____ and the _____ side of the piston.

8. At the top of the piston, atmospheric pressure and downstream venturi pressure are channeled into separate _____.

9. In the STROMBERG carburetor the chambers are separated by a _____.

10. The downstream side of the piston is vented to the top of the piston by two drillings in the _____.

11. The underside of the deaphragm is vented to the atmosphere through a drilling in the _____ body.

12. The tapered fuel _____ _____ varies the jet opening side as the needle moves up and down with the piston.

13. The movement of the needle controls the amount of _____ flowing into the venturi.

14. During idle operation, the piston is only partially raised because there is only a slight difference between _____ pressure and the _____ venturi pressure.

15. At cruise, the substantial difference between atmospheric pressure and downstream venturi pressure cause the piston to be held _____ open.

16. During acceleration, the initial movement of the piston is limited by the piston _____.

17. After initial dampening, the piston moves to the _____ _____ position, during acceleration.

ADJUSTMENTS AND TUNING (Answer true or false)

1. It is not necessary to use a flow meter when tuning twin carburetors as any good technician should be able to tune them by ear. T ____ F ____

2. STROMBERG and SU carburetors have the same adjustment and tuning procedure. T ____ F ____

3. Specification for carburetor setting can be found on the emission decal and in the workshop manuals and training aids. T ____ F ____

NOTES

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