SECTION S, FUEL SYSTEM

Marvel-Schebler Carbureter

Marvel-Schebler Carbureters are used on thousands of tractor and industrial engines and have been designed to provide many years of trouble-free service, however, as in the case of all mechanical devices, they do in time require proper service and repairs. An understanding of their construction and how they operate as well as an understanding of their function with respect to the engine will not only avoid many false leads on the part of the service man in diagnosing so-called carbureter complaints but will create customer satisfaction and a profitable business for the progressive service shop.

To understand a carbureter it is necessary to realize that there is only one thing that a carbureter is designed to do and that is to mix fuel and air in the proper proportion so that the mixture will burn efficiently in an engine. It is the function of the engine to convert this mixture into power.

There are three major factors in an engine which control the change of fuel and air into power: 1—Compression. 2—Ignition. 3—Carburetion.

Carburetion has been listed last because it is absolutely necessary for the engine to have good compression and good ignition before it can have good carburetion.

When the average person thinks of "carburetion" they immediately think of the carbureter as a unit. Carburetion is the combined function of the carbureter, manifold, valves, piston and rings, combustion chamber, and cam shaft.

It can be readily seen that "carburetion" is a far deeper subject than consideration of the carbureter alone, and expecting the carbureter to cure faulty ignition, compression, valves, etc. will only result in wasted time and effort on the part of the service man and added expense to the customer.

It must be remembered that the function of the carbureter does not extend beyond delivering the proper mixture of fuel and air to the manifold and the other factors which effect power and economy cannot be changed or corrected by the carbureter. Inability to understand all the factors that effect engine operation is the reason many service mechanics change from factory standards and attempt to improve on the engine set-up by their own methods or "standards". All that any service mechanic should ever try to do is to make the particular engine he is working on as good as the manufacturer intended it to be, but he can make it a lot worse. Far too many engines are running below their standard of performance in service today.

For the carbureter to accomplish its function it must be able to vary the mixture strength dependent upon the engine demands. It must supply a mixture strength that will allow the engine to give maximum horsepower, whenever the throttle is fully opened, while at part throttle conditions it must lean out the mixture so that maximum economy can be obtained. In addition it must have flexibility throughout the entire range of operating speeds, from idle and part throttle to full power wide open throttle position. The carbureter must also have an accelerating "well" with enough fuel capacity to start handling sudden maximum loads. In other words the carbureter not only varies the volume of fuel and air that enters the engine but also varies the amount of fuel that goes in with a given amount of air, in order to produce the proper mixture proportion for any condition under which the engine is operating at any time.

In order to understand the function and operation of the Marvel-Schebler Tractor and Industrial Carbureters it is well to consider the systems that make up each carbureter. These systems are: The Float System, The Idle System, The Power Fuel Feed System, The Back Suction Economizer System, and The Choke System.

A thorough knowledge of each system will help the service mechanic to quickly locate and correct legitimate carbureter complaints as well as to inspect, repair, and put back to standard any carbureter that requires an overhaul.

SECTION S, FUEL SYSTEM

Float System

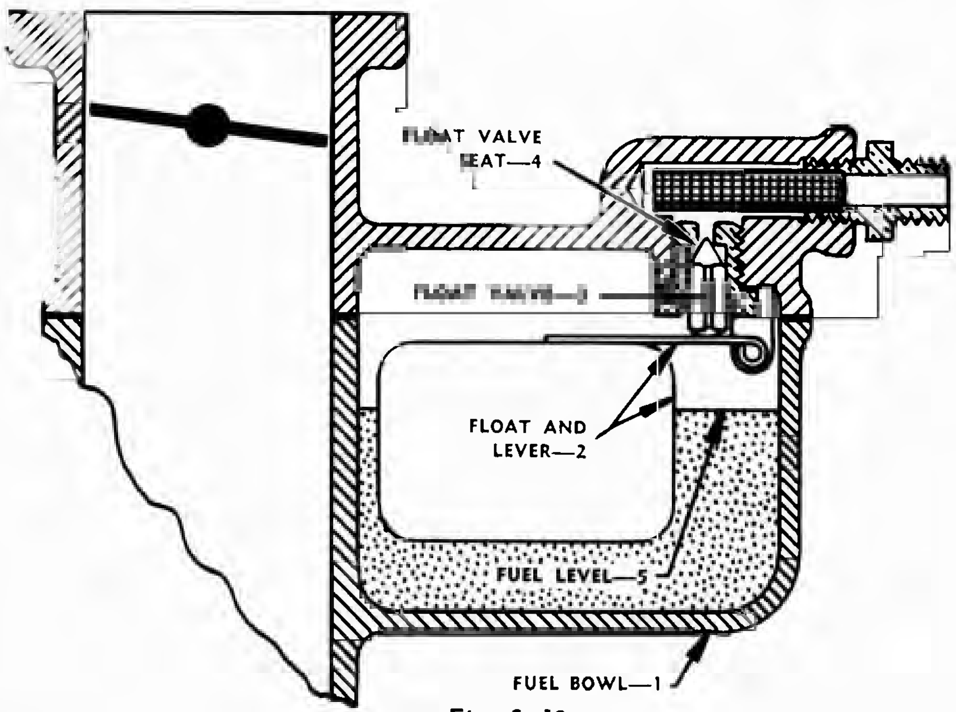


Fig. S-13

The float system controls the level and supply of gasoline in the fuel bowl throughout the operating range of the engine.

When the fuel bowl (1) is empty the float and lever (2) and float valve (3) drop and fuel under pressure from the fuel pump (or gravity feed) is forced through the float valve seat (4) around the float valve (3) and into the fuel bowl (1). As the fuel in the bowl approaches the correct operating level it raises the float and lever (2) with enough force to raise the float valve and cut off the flow of fuel into the bowl. As fuel feeds through the carbureter jets into the engine the fuel level (5) drops, allowing additional fuel to enter the fuel bowl.

Under actual operating conditions the fuel level (5) and float and lever (2) automatically position themselves so that the inward flow of gasoline to the carbureter is equal to the outward flow of gasoline to the engine.

As can readily be seen the float system under the most favorable of operating conditions is subjected to a certain amount of wear. Under severe conditions or conditions that result in excessive vibrations being transmitted to the carbureter, float valve and float valve seat wear is accelerated.

It should be an established policy that whenever the carbureter is disassembled for whatever cause the service man make following checks:

1. Examine float valve for any signs of wear. If it is not absolutely true or is grooved and hasn't a perfect taper, a new float valve and also a new float valve seat must be used. These float valves and seats are supplied in matched sets and are tested at the factory for leaks. Always use a new float valve seat gasket to make sure of a perfect seal.
2. Examine float for any signs of failure. To test metal float submerge float in pan of hot water and if air bubbles are observed replace with new float.

   Examine cork float for bare places or cracks in coating. If either are found, or if float shows evidence of having been soggy, replace with new one. (Do not attempt to recover float with shellac or varnish.)
3. Set float height to the proper specification for the particular model carbureter being serviced. Make certain that the entire assembly works free and that there is no binding.
4. Wash fuel strainer assembly in gasoline and clean screen with air under pressure. If the screen, or the threads on the strainer are not in good condition, install a new assembly. When re-installing fuel strainer assembly always use a new strainer gasket if a gasket is used to obtain a seal.

   It has been proven, with few exceptions, that with a float system in good order, carbureter flooding only occurs when dirt or foreign matter becomes lodged between the float valve (3) and float valve seat (4).

SECTION S, FUEL SYSTEM

The Idle System

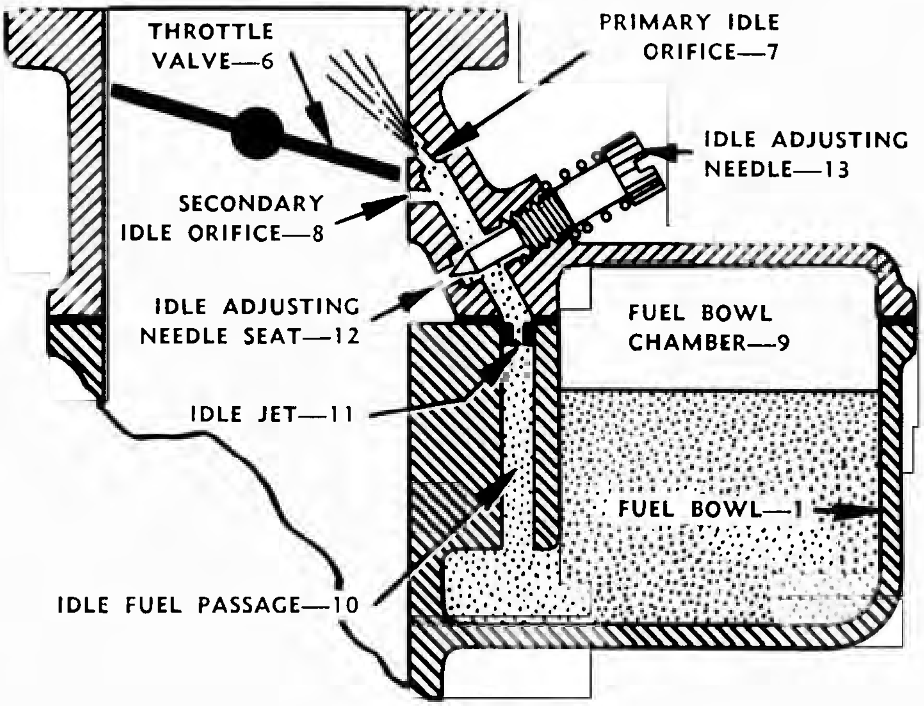


Fig. S-14

The idle system controls the flow of fuel at idle speed and at slow speeds until the throttle is opened wide enough to allow the power fuel feed system to function.

When the throttle valve (6) is in the idle position the edge of the valve is between the primary idle orifice (7) and the secondary idle orifice (8). With the valve in this position the air pressure (manifold vacuum) at the primary idle orifice (7) is lower than the air pressure in the fuel bowl chamber (9) and fuel is forced from the fuel bowl (1) into the idle fuel passage (10). As the fuel travels through the idle fuel passage (10) it passes through the metering orifice of the idle jet (11) to the point where it is combined with air entering through the idle adjusting needle seat (12). The mixing of air with gasoline helps to atomize the fuel and this process is repeated at the secondary idle orifice (8) as the fuel travels through the idle fuel passage (10). As this rich mixture of fuel and air emerges from the primary idle orifice (7) it is reduced to correct proportions by the air which passes around the throttle valve (6) since this valve must be slightly open to permit the engine to idle. The resultant mixture is correct for operating engine at idle speed, provided the idle adjusting needle (13) is properly adjusted.

As the throttle valve (6) is slowly opened from the slow idle position it gradually subjects the secondary idle orifice (8) to intake manifold vacuum, and the secondary idle orifice (8) no longer bleeds air to the idle fuel passage (10) but feeds an additional quantity of fuel into the engine. This is proper since the throttle valve is now open wider and will admit a greater amount of air to blend with this additional fuel to maintain the correct proportions of fuel and air for the engine.

As the throttle valve (6) is opened still wider, the idle fuel delivery begins to fade out, however, the throttle valve at this point is far enough open for the power fuel feed system to begin functioning.

The idle system as described above is the most positive and satisfactory of idle systems, as it is working under very high suction and the mixture flows through the small passages and orifices at very high velocities. It is necessary to bear in mind, however, that there are times when these small holes may become plugged with particles of dirt or foreign matter and will require cleaning. At such times the passages, jets, and small drilled holes should only be cleaned with a cleaning fluid such as gasoline and air under pressure. Never use drills or wires as a change in size of these small openings will change the entire calibration of the carbureter.

SECTION S, FUEL SYSTEM

Power Fuel Feed System

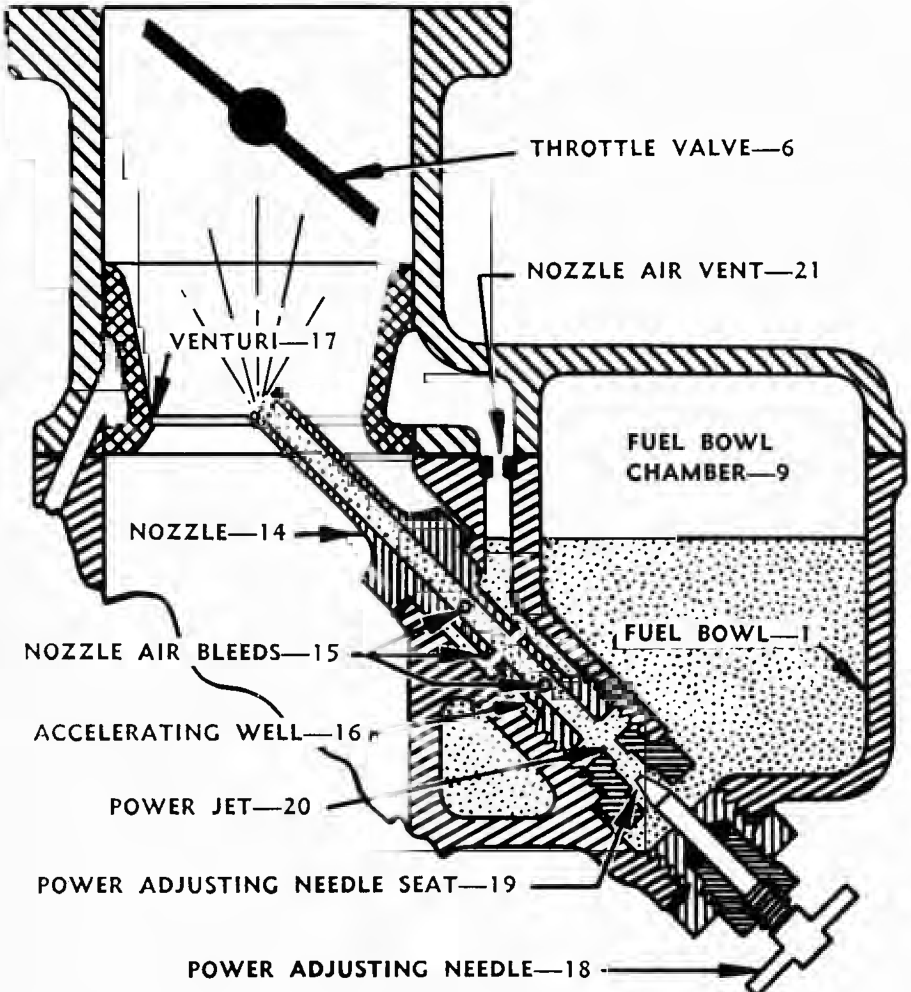


Fig. S-15

With the throttle valve (6) in slow or just off slow idle position, fuel rises up through the nozzle (14) and out the nozzle air bleeds (15) to fill the accelerating well (16) to approximately the height of the fuel level in the fuel bowl (1).

As the engine speed is increased from the slow idle position the air flow through the venturi (17) is gradually increased, and as the idle system begins to diminish the velocity through the venturi (17) is high enough to create a pressure at the tip of the nozzle (14) slightly less than the pressure in the fuel bowl chamber (9) and the accelerating well (16). Fuel, therefore, feeds from the fuel bowl (1) through the opening between the power (load) adjusting needle (18) and the power adjusting needle seat (19), through the power jet (20) and out the nozzle (14) to be discharged into the air stream at the venturi (17). At the same time, the fuel that is stored in the accelerating well (16) is also forced through the nozzle air bleeds (15) into the nozzle (14). But, because the size of the power jet (20) and the position of the power adjusting needle (18) restrict the amount of fuel which can enter the nozzle (14), the fuel in the accelerating well (16) will soon be exhausted and air will then enter through the nozzle air bleeds (15) to mix with the fuel passing through the nozzle (14). The amount of air that can enter into the nozzle (14) is limited by the size of the nozzle air vent (21).

The result of air bleeding into the nozzle (14) is, to help atomize or break up the fuel into finer particles, to regulate the quantity and the rate of discharge of the fuel fed from the accelerating well (16), during acceleration, and to provide the correct mixture proportions for full throttle operation.

As the throttle valve is opened toward the wide open position the velocity through the venturi (17) continues to increase, lowering the air pressure at the nozzle (14) and resulting in additional fuel being supplied to the engine as the speed is increased.

When the throttle valve (6) is opened suddenly from slow or just off slow idle position, the fuel stored in the accelerating well (16) is forced out through the nozzle air bleeds (15) very rapidly and serves to provide the extra richness required by the engine to meet the sudden load. When the throttle valve (6) is closed fuel again fills the accelerating well (16), ready for the next acceleration.

SECTION S, FUEL SYSTEM

Back Suction Economizer System

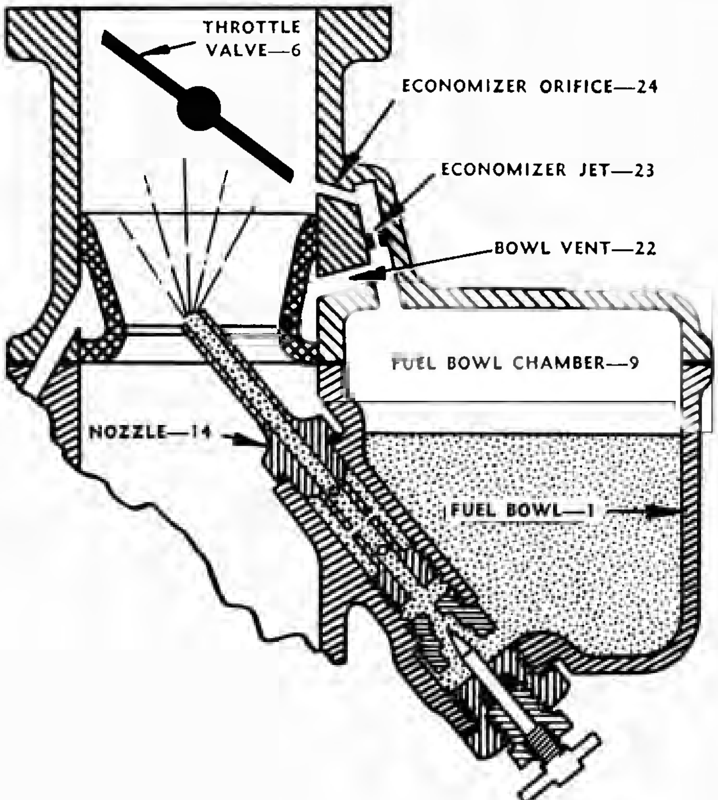


Fig. S-16

The amount of fuel supplied to an engine is controlled by the size of the power jet, the position of the power adjusting needle, and the difference in air pressure between the fuel bowl chamber and the venturi. However, in many engines the mixture must be leaned out additionally during part throttle operation to obtain maximum economy. To provide this leaner mixture Marvel-Schebler Tractor and Industrial Carbureters make use of the "Back Suction Economizer System. With this method of metering fuel, the air pressure in the fuel bowl chamber is regulated and controlled according to load conditions by a combination of bowl vent and economizer passages communicating with the throttle bore of the carbureter. Through regulations of the air pressure in the fuel bowl chamber the fuel flow through the carbureter can be controlled to provide the proper mixture proportions for the engine.

All the air that enters the fuel bowl chamber (9) must first pass through the air cleaner and the bowl vent (22). The size of the bowl vent (22) controls or limits the amount of air that can enter the fuel bowl chamber (9). The amount of air that is drawn out of the fuel bowl chamber (9) is controlled by the size of the economizer jet (23), the economizer orifice (24) and the position of the throttle valve (6) as its position determines the manifold vacuum or suction on the economizer orifice (24). As the throttle valve (6) is opened from the fast idle position the economizer orifice (24) is gradually exposed to manifold suction, and air flows from the fuel bowl chamber (9), through the economizer jet (23) and out the economizer orifice (24). This air must be replaced by air entering through the bowl vent (22) but as the size of the bowl vent (22) restricts the amount of air that can enter, the resultant pressure in the fuel bowl chamber (9) will be lowered, reducing the difference in air pressure between the nozzle (14) and the fuel bowl chamber (9). The flow of fuel will therefore be retarded so that the exact economy mixture ratio will be delivered to the engine at this particular throttle opening. Opening the throttle valve (6) further exposes the entire economizer orifice (24) to manifold suction, resulting in additional air being removed from the fuel bowl chamber (9), again leaning out the mixture ratio to the correct proportions for this new throttle position. After the economizer orifice (24) is fully exposed to manifold suction the amount of air that is drawn out of the fuel bowl chamber (9) is controlled by the manifold vacuum or suction at any given throttle valve (6) position and as this suction decreases as the throttle approaches wide open position, less air is drawn out of the fuel bowl chamber and additional fuel flows to the engine to provide the extra richness required for operation at heavy loads where maximum horsepower is necessary.

The "'Back Suction Economizer System" assures the proper metering of fuel to the engine throughout the service life of the carbureter as there are no moving parts to wear out or adjustments to get out of order. It is essential, however, that the system remain free of dirt and foreign matter because any foreign substance in the system will restrict the flow of air thereby creating improper pressures in the fuel bowl chamber and resulting improper fuel delivery to the engine.

SECTION S, FUEL SYSTEM

Choke System

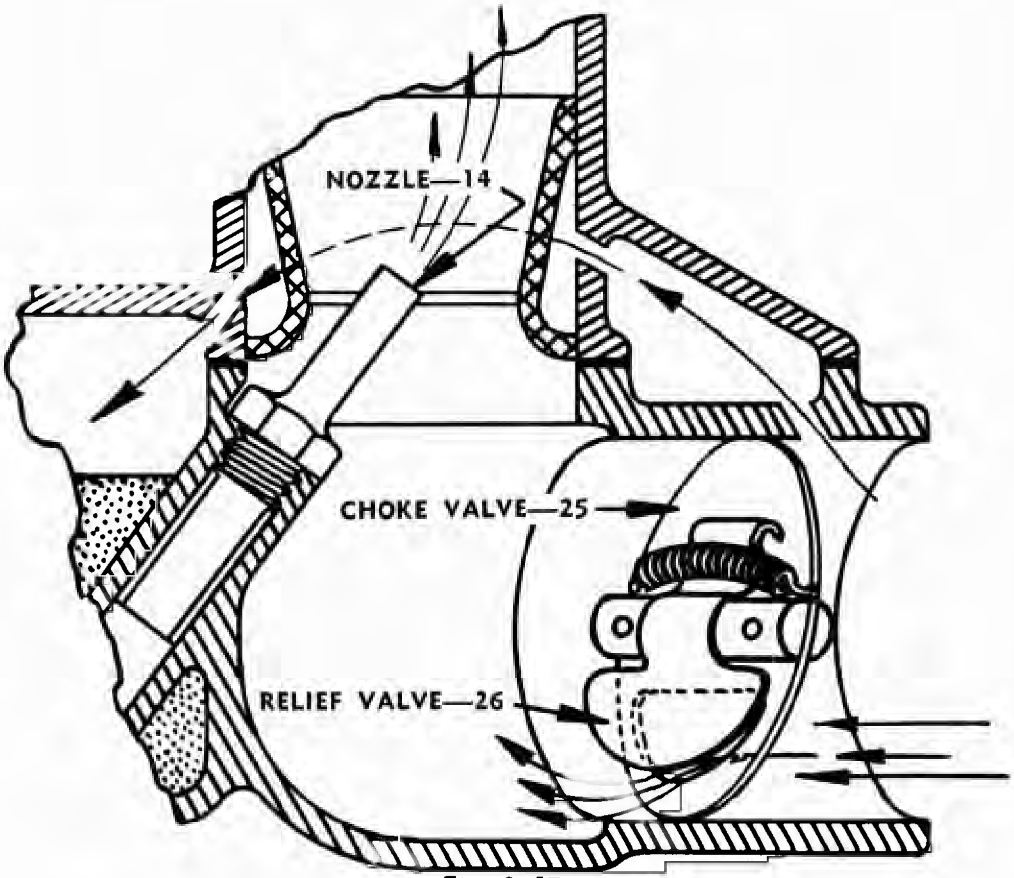


Fig. S-17

The choke system is used during cold starting and the warm-up period. Under these cold conditions it is necessary to supply an additional rich mixture of fuel and air, as only the "light ends" or more volatile portions of the fuel will vaporize with the manifold and air temperatures at these cold conditions. Consequently it is necessary that a large quantity of fuel be available so that there will be enough "light ends," to combine with the air to form a combustible mixture for starting the engine.

The function of the choke valve (25) is to restrict the amount of air that can enter the carbureter and to increase the suction on the nozzle (14) so that additional fuel will be drawn into the manifold. As soon as the engine fires and runs the rich mixture must be rapidly reduced to prevent stalling. This change in mixture is accomplished by the operator positioning the choke valve to provide the proper mixture. However, a few degrees movement of the choke valve (25) will make a big change in the mixture strength and to help reduce the sensitivity of the choke valve (25) position use is made of a spring loaded relief valve (26) in many applications. This valve opens automatically with engine speed and load and eliminates a great deal of manipulation of the choke on the part of the operator.

When the engine has obtained normal operating temperature the choke valve (25) must be fully opened to assure maximum power and economy. In addition, extended use of the choke results in more gasoline being supplied to the engine than can be burned. A large percentage of the unburned gasoline is lost through the exhaust system. The remainder of the raw gasoline is forced between the pistons and cylinder walls, washing away the protective oil film and increasing engine wear, and enters the crankcase where it dilutes the engine oil.

Any adjustments that are necessary on the carbureter should never be attempted until the engine has obtained its normal operating temperature and the choke valve (25) has been placed in the wide open position.

SECTION S, FUEL SYSTEM

Model TSX Carbureter

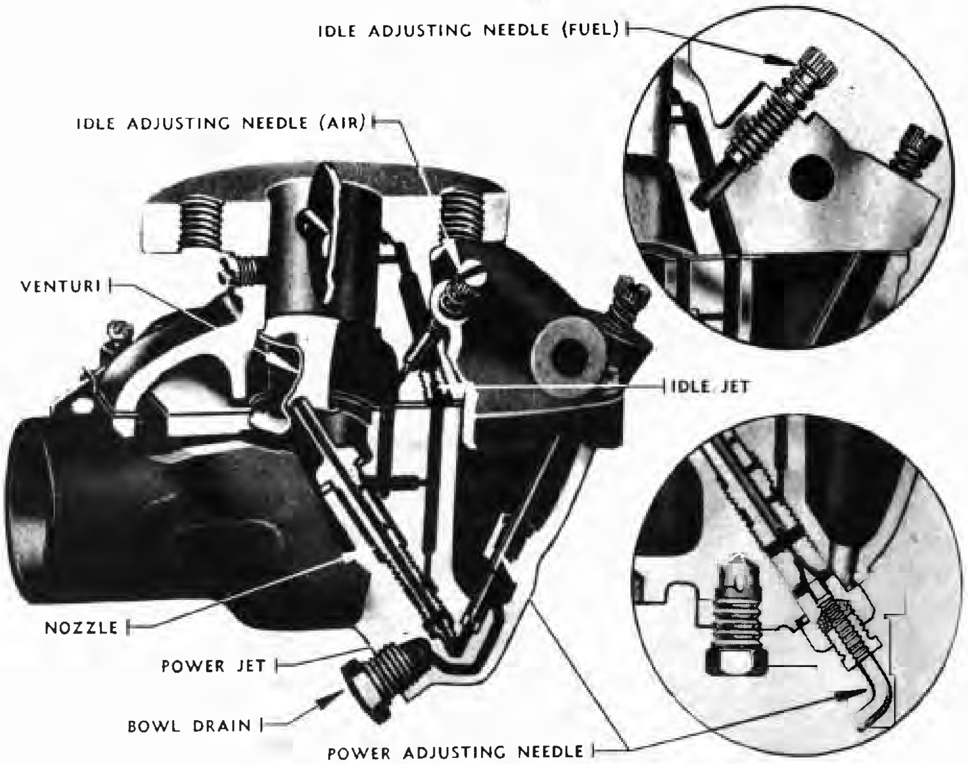


Fig. S-18 Idle and Power Fuel Feed Systems

The Marvel-Schebler Model TSX Carbureter is manufactured in three S.A.E. nominal sizes: 7/8 inch, 1 inch, and 1¼ inch. In addition to these variations in size, there are also variations necessitated by the specific requirement of the engines on which the carbureters are used. Many engines, for instance, require special throttle and choke operating levers, and for purpose of calibration, they may have different size jets, nozzles, venturii, etc. For this reason when ordering parts, refer to the individual carbureter service parts list for the engine on which the carbureter is installed.

The Model TSX Carbureter consists of only two major castings:

1. The throttle body casting which forms the cover for the fuel bowl.
2. The fuel bowl casting which contains the air inlet.

Cast iron material is used for ruggedness. It will be noticed (Fig S-18) that all passages, whenever possible, are drilled from the top face of the fuel bowl casting to prevent any fuel leaks to the outside of the carbureter, because of shrunken gaskets or defective hole plugs, and also to prevent vapor lock or "percolation" of the fuel when the carbureter is operated under extremely hot conditions, resulting in hard starting or erratic engine operation.

The Model TSX carbureter is completely sealed against dust or dirt. All air entering the fuel bowl of the carbureter must first pass through the air cleaner. The throttle shaft bearings and choke shaft bearings are sealed to eliminate dust and dirt entering at these points.

The back suction economizer system Fig. S-19 is provided with a removable economizer jet. The size of this jet has been carefully established by engineering tests to provide the exact fuel requirements for maximum economy at part throttle operation. Always use the economizer jet specified in the individual carbureter service parts list to assure proper engine operation. On some carbu-

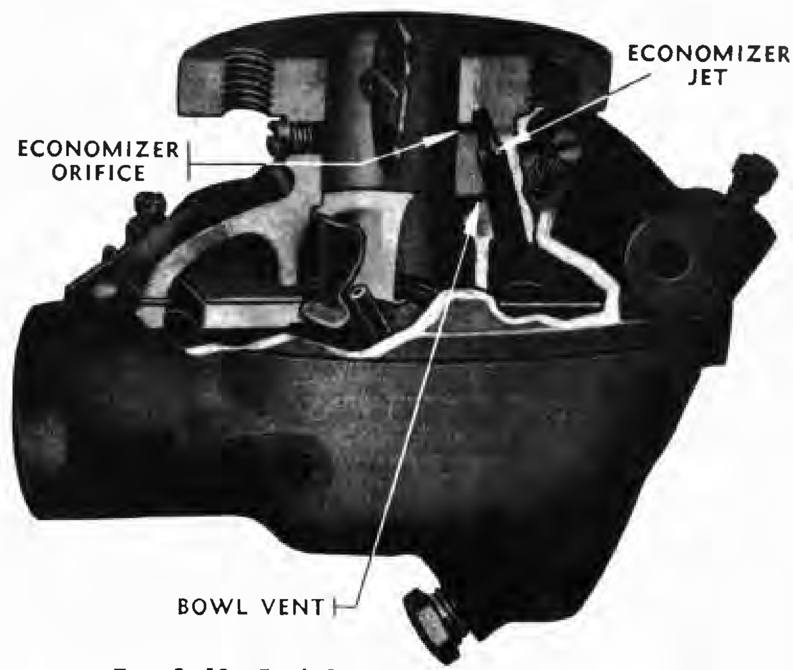


Fig. S-19 Back Suction Economizer System

SECTION S, FUEL SYSTEM

Model TSX Carbureter

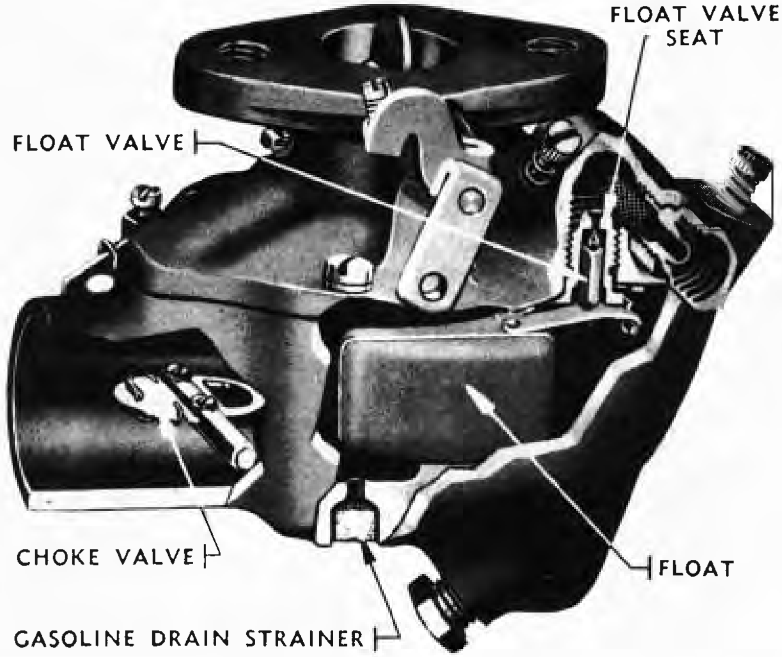


Fig. S-20 Float and Choke Systems

reter models the proper fuel requirements are established without the use of an economizer jet and the fixed economizer orifice machined in the carbureter throttle body regulates the fuel supplied to the engine. In addition, there are engine and carbureter combinations that do not require the back suction economizer system. In these carbureters the economizer orifice has not been machined in the throttle body casting.

To provide additional economy, in addition to the back suction economizer system, some carbureters are provided with two adjusting needles, the low speed or idle adjusting needle, and the power or load adjusting needle. However, the power adjusting needle is not always required and for applications of this nature the fixed jet type carbureter is used in which the power jet controls the amount of fuel that is supplied to the engine.

There are two variations in carbureters having the power adjusting needle, commonly called the adjustable jet type carbureter. In Fig. S-18 is shown these two arrangements. The adjustment of either type is accomplished in the same manner.

A large percentage of the Model TSX Carbureters are provided with an idle adjusting needle which alters the fuel and air proportions of the mixture which enters the carbureter bore from the idle passage. This is known as an air adjusting idle needle. The upper inset in Fig. S-18 shows an idle adjusting needle which alters the amount of fuel and air mixture which enters the carbureter bore from the idle passage. This is commonly known as a fuel adjusting idle needle. It is important to remember in setting the idle mixture the air adjusting idle needle must be turned in, or clockwise, to enrich the idle mixture, and the fuel adjusting idle needle must be turned out, or counter-clockwise to enrich the idle mixture.

A dual float mechanism Fig. S-20 is used in a fuel bowl that almost completely surrounds the nozzle. This design and construction is such that the tractor, or engine, can be operated at any angle up to 45 degrees without seriously affecting the fuel and air ratio and without flooding because the mean level at the nozzle tip is practically constant at any angle of operation.

Some carbureters are equipped with a spring-loaded governor control lever to permit manual closing of the throttle to an idle position for engines equipped with certain type governors. An example of this type lever is shown in Figure 4, however, there are other variations of this type dependent upon the particular application.

While there are many variations produced by combining the different types and sizes into a specific application, all Model TSX carbureters incorporate the same engineering principles and are alike from a functional standpoint.

Fig. S-21 Spring-Loaded Governor Lever

SECTION S, FUEL SYSTEM

Service Instructions for Model TSX Carbureters

Type A—Fixed Jet

Type B—Adjustable Jet

Type C—Adjustable Jet

The following procedure for service of all Model TSX Carbureters is for a complete overhaul. After removing carbureter from engine wash thoroughly with cleaning fluid such as gasoline to permit examination of external parts for damage. For type carbureter being serviced see illustrations above. Instructions apply to all types unless specified otherwise.

1—

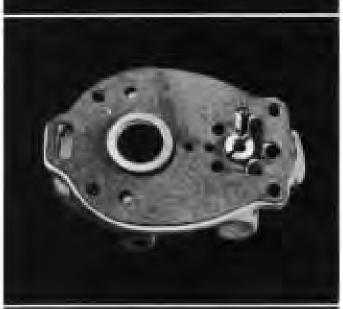
Remove Power Adjusting Needle Assembly.

Type B.

2—

Remove Bowl Cover Screws and Lock Washers

Separate Castings.



3—

Remove Float Valve, Bowl Gasket, and Venturi.

If Valve is grooved or damaged, replace Valve and Float Valve Seat.

4—

Remove Float Valve Seat and Gasket.

5—

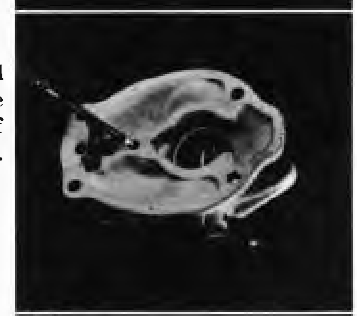
Remove Economizer Jet.

NOTE. Not required in all carbureters. Check service parts list or repair kit of carbureter being serviced.

6—

Remove Idle Jet

NOTE. Not required in all carbureters. Check service parts list or repair kit of carbureter being serviced.



7—

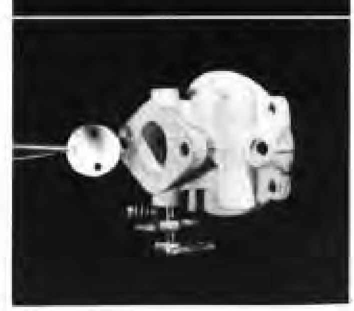
Removing Idle Adjusting Needle and Spring

Replace with new Needle if grooved or damaged

8—

Remove Throttle Valve Screws, Valve, and Throttle Shaft and Lever Assembly

Replace with new shaft and lever assembly if excessive looseness between shaft and throttle body.



GROUP II, ENGINE

SECTION S, FUEL SYSTEM

9—

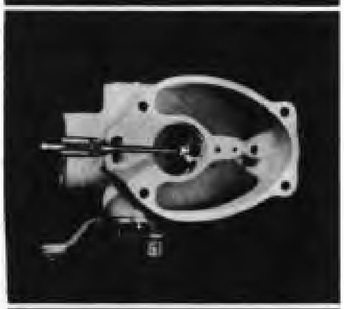
Remove Throttle Shaft Packing Retainer and Packing

Force out Retainer with small screwdriver or punch

10—

Remove Main Nozzle and Gasket.

Type A
Type B



11—

Remove Power Jet.

Type A
Type B

12—

Remove Power Adjusting Needle Assembly.

Type C

Carbureters not having adjustable needle remove power jet.

13—

Remove Main Nozzle and Gasket.

Type C

14—

Remove Retainer Plug and Gasoline Drain Strainer.

Strainer can only be replaced on carbureters having a curled hair or felt type strainer. Only replace when impossible to clean with gasoline and compressed air. Porous metal type strainer cannot be replaced. Clean only.

15—

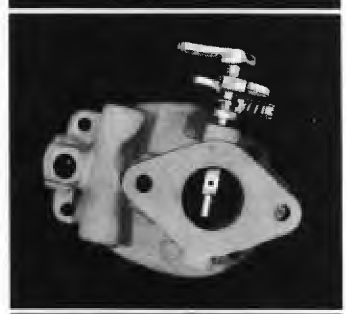
Remove Choke Valve Screws, Valve, Choke Shaft & Lever Assembly, Choke Return Spring, and Choke Bracket.

16—

Remove Choke Shaft Packing Retainer and Packing.

Force out retainer with small screwdriver or punch.

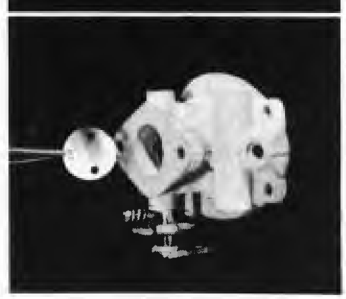
*ASSEMBLE



17—

Install Throttle Shaft Packing and Retainer.

Assemble new retainer and packing on throttle shaft. Insert shaft in carbureter and tap lightly until retainer is flush with casting face.



18—

Install Throttle Valve and Screws.

Install valve with angle identification mark facing flange face of carbureter. Tap valve lightly to center in throttle bore. Tighten screws securely.

***Before assembling carbureter, clean castings, channels, and parts with carbureter cleaning fluid and air under pressure. Make certain all small holes and channels are open and free from carbon and dirt. Do not use wire or small drills to clean out small holes as a slight change in size of these holes will affect the carbureter operation. To assure a successful overhaul always replace all worn or damaged parts and any parts that are questionable. Always use all new gaskets.**

GROUP II, ENGINE

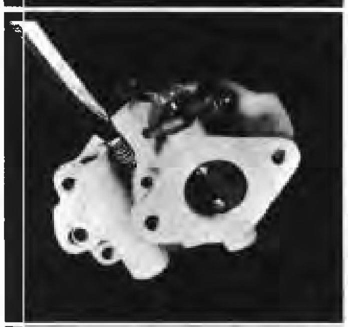
SECTION S, FUEL SYSTEM

19—

Install Economizer Jet.

20—

Install Idle Jet.



21—

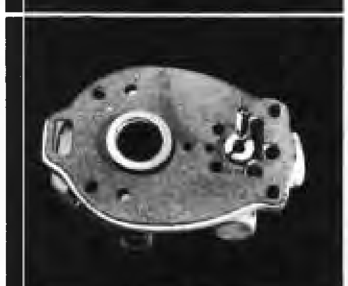
Install Idle Adjusting Needle and Spring.

Set approximately one turn from seat for preliminary setting.

22—

Install Float Valve Seat and Gasket.

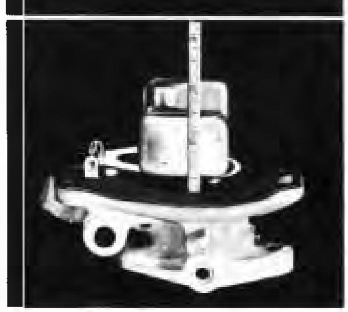
Use new Float Valve and Seat Assembly.



23—

Assemble Bowl Cover Gasket and Venturi in Casting.

Install float valve.



24—

Install Float and Lever Assembly and Float Lever Pin.

Set floats ¼" from gasket face to nearest edge of float, keeping edge of float parallel with gasket. Adjust by using bending tool #M-8.

25—

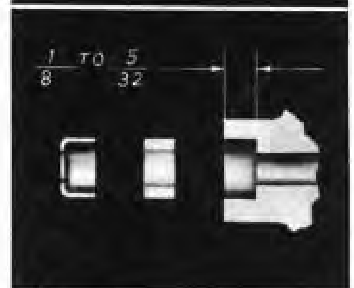
Install Choke Shaft Packing Retainer and Packing.

Install retainer as shown in illustrations below.

Note: On some carbureter models the packing is retained by choke bracket in place of packing retainer.

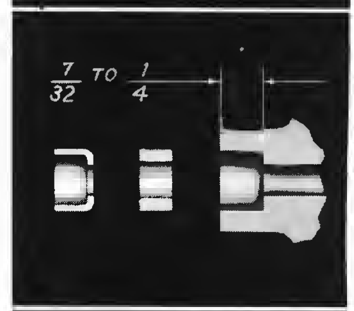
25A—

On carbureters counterbored ⅛" to $\frac{5}{32}$" deep install retainer with cup facing towards casting. Tap lightly until flush with casting face.



25B—

On carbureters counterbored $\frac{7}{32}$" to ¼" deep install retainer with cup facing away from casting. Tap lightly until flush with casting face.



26—

Install Choke Bracket, Choke Return Spring, Choke Shaft and Lever Assembly, Valve, and Screws.

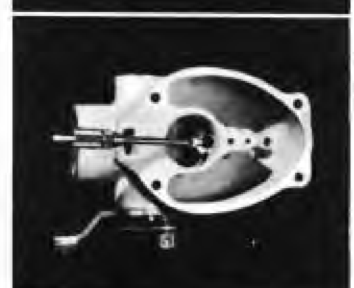
Center valve in casting before tightening screws.

27—

Install Power Jet.

Type A

Type B



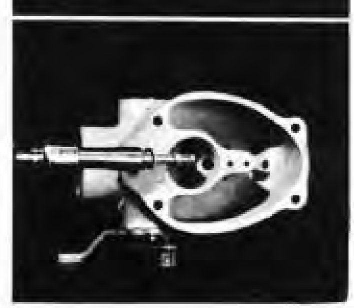
28—

Install Main Nozzle and Gasket.

Type A

Type B

Use new gasket.



GROUP II, ENGINE

SECTION S, FUEL SYSTEM

29—

Install Main Nozzle and Gasket.

Type C

Use new gasket.

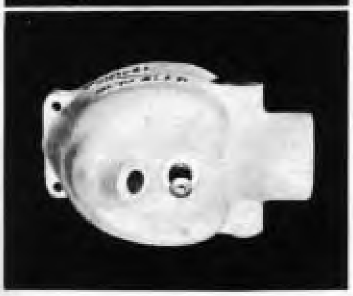
30—

Install Power Adjusting Needle Assembly.

Type C

Use new gasket.

Set approximately one turn from seat for preliminary setting.



31—

Install Gasoline Drain Strainer & Retainer Plug.

Stake retainer plug in place with center punch to insure secure locking.

32—

Assemble Castings.

Invert throttle body and lower fuel bowl over floats taking precaution that venturi guides bodies into position.

33—

Install Bowl Cover Screws and Lock Washers.

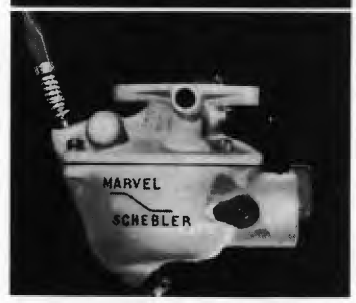
Tighten screws gradually until all are tight.

34—

Install Power Adjusting Needle Assembly.

Type A

Set approximately one turn from seat for preliminary setting.



Adjustment Instructions

PRELIMINARY ADJUSTMENTS

Set throttle stop screw so that throttle valve is open slightly. Make certain that fuel supply to carbureter is open. Close choke valve. Start engine and partially release choke. After the engine has been run sufficiently to bring up to operating temperature throughout, see that choke is returned to wide open position.

LOW SPEED OR IDLE ADJUSTMENT

Set throttle or governor control lever in slow idle position and adjust throttle stop screw for the correct engine idle speed. (On a new, stiff engine this speed must be slightly higher than required for a thoroughly run-in engine.) Turn idle adjusting needle* until engine begins to falter or roll from richness, then turn needle in the opposite direction until the engine runs smoothly.

NOTE: It is better that this adjustment be slightly too rich than too lean.

*IDLE ADJUSTING NEEDLE—AIR ADJUSTING

To richen the idle mixture turn the idle adjusting needle to the right or clockwise.

*IDLE ADJUSTING NEEDLE—FUEL ADJUSTING

To richen the idle mixture turn the idle adjusting needle to the left or counter-clockwise.

POWER OR LOAD ADJUSTMENT (TYPE B, TYPE C)

With the engine running at governed speed under load, turn power adjusting needle to the right, or clockwise, a little at a time until the power drops appreciably. Then turn the needle to the left, or counter-clockwise, until the engine picks up power and runs smoothly. This will give an economical part throttle mixture, and, due to the economizer action, the proper power mixture for full throttle operation. Due to variations in temperature or fuels it may be necessary to richen up this mixture by backing out the power adjusting needle, a small amount at a time until good acceleration is obtained.

NOTE: Carbureters TSX-107, TSX-330, TSX-339, TSX-355, TSX-385 and TSX-398 *use the fuel adjusting type idle needle. All other Model TSX Carbureters use the air adjusting type idle needle.*

SECTION S, FUEL SYSTEM

Service Complaints

IDLE—UNEVEN IN OPERATION

The idle construction used in Marvel-Schebler Tractor and Industrial Carbureters is the most positive and satisfactory of idle systems, because it is working under very high suction and the mixture flows through the small passages at very high velocities. It is necessary to bear in mind, however, that there are times when these small holes may become plugged with particles of dirt or lint, but very seldom. If idle trouble is experienced, first check the manifold to cylinder head gasket and the carbureter to manifold gasket for air leaks. At slow idle an engine requires only approximately 20 to 25 lbs. of air per hour, and a slight leak will result in a very erratic or rough idling engine.

Other causes for a rough idling engine are: uneven compression, caused by sticky or leaking valves; leaking valve seats; tappets with improper clearances; leakage past pistons and rings; cylinder head gasket leaking; weak spark, or spark plug points not spaced correctly; ignition cable covering cracked and thus grounding spark, and cable not assembled properly in the distributor cap which causes corrosion and weak spark.

The spark timing of the engine is most important, and should also be checked very carefully and set exactly on the mark as called for in factory standard specifications. In fact, all of the above items must be checked very carefully to factory standards, and not just given a casual inspection with the common expression "Everything **looks O.K." You can KNOW definitely that the tractor is up to the standards set by the manufacturer.**

POWER AND ECONOMY—LOW

Complaints are received from the field that the engine will not pull or develop its maximum horsepower, or that it develops good power, but uses far too much fuel. Too often a service man will at once change the carbureter to correct these complaints, but by so doing he may not be successful in overcoming the difficulty.

It must be clearly understood by all servicemen that when a new engine is designed and developed the management first decides what horsepower they want this engine to produce at a definite rated speed. The engineering department develops the new engine to pull the required horsepower. In the design there are certain fixed dimensions that never change. For instance, the bore and stroke, the displacement, compression ratio, diameter of valves, lift of valves, diameter of intake passage. The carbureter engineer works out the diameter of throttle bore, venturi size, and provides for means of adjusting and regulating the power fuel mixture ratio, as well as the idle. Now, in service, consider, that the compression, ignition, and timing have been checked and found to be 100% in this engine. If the air intake temperature and the water temperature is held constant, then the only variable we have that affects maximum horsepower is the fuel mixture ratio.

If compression, ignition, and timing, which are variable, are first properly checked by a service man and set to factory specifications, very little difficulty will be experienced in adjusting the carbureter to give the maximum horsepower and economy.

A great deal has been said regarding the importance of engine tune-up and the reasons for service men being exact in their service work on engines. The reasons why a carbureter may not

SECTION S, FUEL SYSTEM

function properly when everything else has been checked and set to factory standards will now be covered.

With the present type carbureter construction used on Marvel-Schebler tractor and industrial carbureters, not very much can go wrong with the possible exception that it may foul with dirt. There are only two places that are subject to wear—the throttle shaft and bushings and the float valve and seat. The wear on the throttle shaft and bushings, and resultant air leak therefrom results in a lean idle, and to compensate for the air leak more fuel must be turned on for idle. Wear on the float valve and seat results in a high fuel level in the fuel bowl and flooding trouble. Both faults can be easily observed by the service man, and corrected by replacing worn parts with new ones. The proper functioning of the carbureter is obtained by a series of holes drilled to exact size and location, which do not wear or change location in service. It must be realize that if the carbureter worked correctly at first, when passed by the inspectors at the tractor factory, it will always function the same, provided these passages are all free from dirt.

On a carbureter complaint from the field, the only thing a service man can do to the carbureter is to disassemble it. BE SURE that the passages are open and free from dirt, that there is no wear on the throttle shaft and bushings, that float valve and seat are O.K., that the float height is correct, and that a good air-tight seal exists around the bowl gasket. If such carbureter service does not correct the complaints, a complete check of the engine must again be made.

To check the float setting, the casting must be held in an inverted position so that the float lever is in contact with the float valve and the float valve seated.

Carbureter Model	Factory Setting	Where to Measure
"TSX" ⅞", 1", 1¼"	¼"	From the gasket to the nearest surface of the float.

NOTE: Changing the float setting from our standard in an effort to improve the operation of the carbureter or in an effort to prevent flooding, will only result in faulty carbureter operation.

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ZENITH 61 AND 161 SERIES CARBURETORS

Fig. S-22

The Zenith 61 and 161 Series carburetors are of updraft single venturi design. They are made in 5/8" and 7/8" S.A.E. barrel sizes; with 5/8", 7/8", 1" and 1¼" S.A.E. flange sizes available. They are made with selective fuel inlet, with or without a back suction economizer and a main jet adjustment.

They are "balanced" and "sealed," and the semi-concentric fuel bowl allows operation to quite extreme angles without flooding or starving. This design makes them particularly adaptable to smaller farm tractors and a great variety of agricultural machines and industrial units.

MODEL DESIGNATION

Type—Updraft.

Material—Barrel and bowl castings, cast iron.

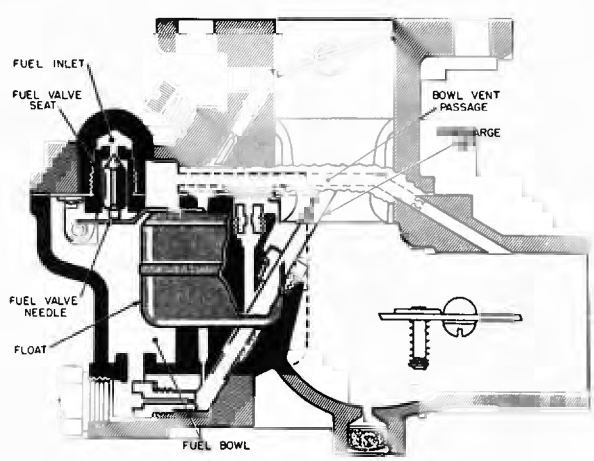
Styles—"A" Throttle and choke shafts parallel.
- "D" Equipped with degasser assembly.
- "E" Elbow air intake.
- "J" Back-suction economizer.
- "R" Built-in governor.
- "S" Straight through air intake.
- "X" Flange next size larger than standard.
- "XX" Flange second size larger than standard.

Size Designation	Nominal Size	Throttle Bore Diameter	Flange Size S.A.E. Standard
5	5/8"	.787 or 25/32"	5/8"
7	7/8"	1.023 or 1 1/32"	7/8"
X7	7/8"	1.023 or 1 1/32"	1"
XX7	7/8"	1.023 or 1 1/32"	1¼"
8	1"	1.181 or 1 3/16"	1"

FUEL SUPPLY SYSTEM

The fuel supply system is made up of the threaded fuel inlet, the fuel valve seat, fuel valve, float and fuel bowl.

The fuel supply line is connected to the threaded inlet. The fuel travels through the fuel valve seat and passes around the fuel valve and into the fuel bowl. The level of the fuel in the fuel chamber is regulated by the float through its control of the fuel valve. The fuel valve does not open and close alternately but assumes an opening, regulated by the float, sufficient to maintain a proper level in the fuel chamber equal to the demand of the engine according to its speed and load.



FUEL SUPPLY SYSTEM

Fig. S-23

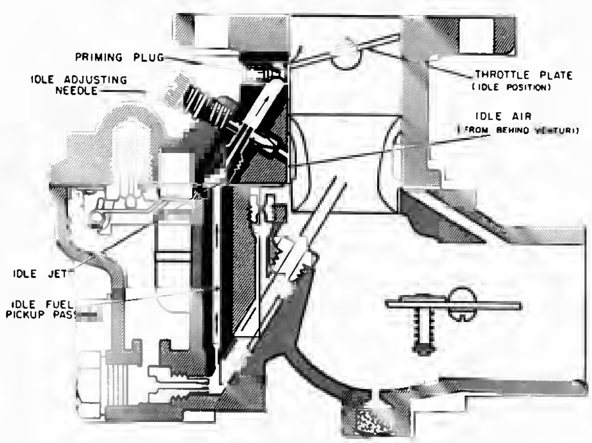
The inside bowl vent as illustrated by the passage originating in the air intake and continuing through to the fuel bowl, is a method of venting the fuel bowl to maintain proper air fuel mixtures even though the air cleaner may become restricted. This balancing is frequently referred to as an "inside bowl vent."

SECTION S, FUEL SYSTEM

IDLE SYSTEM

The idle system consists of the idle discharge port, idle air passage, idle adjusting needle, idle jet, and fuel passage.

The fuel for idle is supplied through the main jet to a well directly below the main discharge jet. The pick-up passage is connected to this well by a restricted drilling at the bottom of this passage. The fuel travels through this channel to the idle jet calibration. The air for the idle mixture originates back of (or from behind) the main venturi. The position of the idle adjusting needle in this passage controls the suction on the idle jet and thereby the idle mixture. Turning the needle in closer to its seat results in a greater suction with a smaller amount of air and therefore a richer mixture. Turning the needle out away from its seat increases the amount of air



IDLE SYSTEM

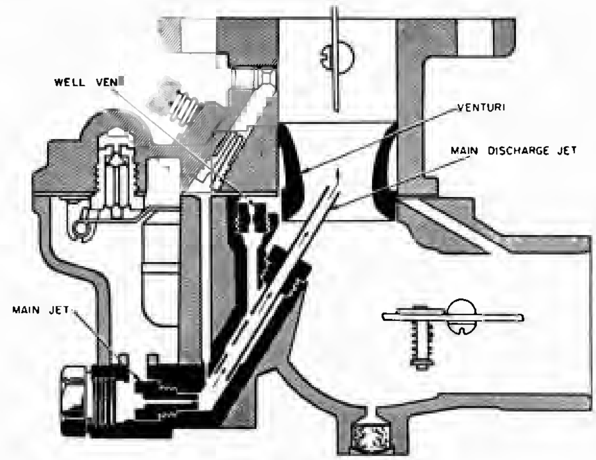
Fig. S-24

and reduces the suction. and a leaner mixture is delivered. The fuel is atomized and mixed with the air in the passage leading to the discharge port (or priming plug) and enters the air stream at this point.

HIGH SPEED SYSTEM

The high speed system controls the fuel mixture at part throttle speeds and at wide open throttle. This system consists of a **venturi,** controlling the maximum volume of air admitted into the engine; the **main jet,** which regulates the flow of fuel from the float chamber to the main discharge jet; the **well vent,** which maintains uniform mixture ratio under changing suction and engine speeds; and a **main discharge jet,** which delivers the fuel into the air stream.

The main jet controls the fuel delivery during the part throttle range from about one-quarter

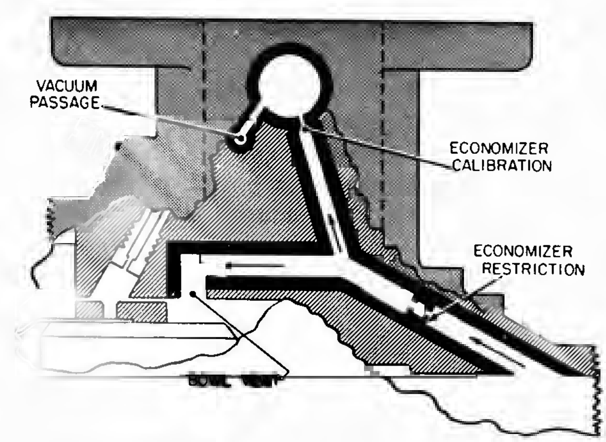


HIGH SPEED SYSTEM

Fig. S-25

to full throttle opening. To maintain a proper mixture ratio a small amount of air is admitted through the well vent into the discharge jet through the air bleed holes in the discharge jet at a point below the level of fuel in the metering well.

The passage of fuel through the high speed system is not a complicated process. The fuel flows from the fuel chamber through the main jet and into the main discharge jet where it is mixed with air admitted by the well vent, and the air-fuel mixture is then discharged into the air stream of the carburetor.



BACK SUCTION ECONOMIZER SYSTEM

Fig. S-26

ECONOMIZER SYSTEM

The economizer system consists of a "milled" slot in the throttle shaft, which acts as a valve to open or close the system; a vacuum passage from the throttle bore to the slot in the throttle

SECTION S, FUEL SYSTEM

shaft; and a vacuum passage from the slot in the throttle shaft to the fuel bowl.

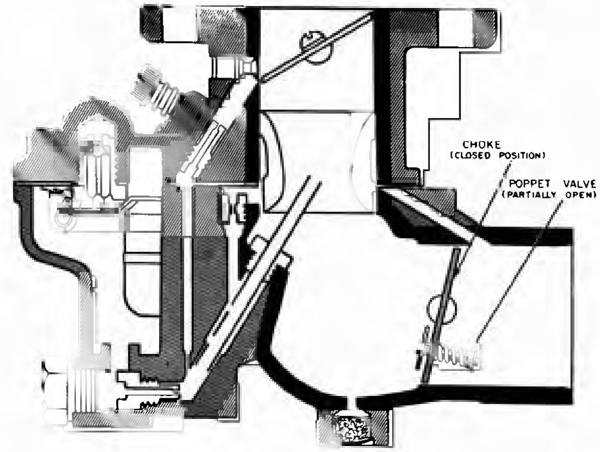
This system allows economical fuel mixture ratios for part throttle operation while still permitting the richer mixture ratios that are needed for full load operation.

The economizer system performs its function by establishing a "back suction" on the fuel in the fuel bowl during most of the part throttle range of operation. This "back suction" is created by manifold vacuum, through the channels connecting the throttle bore with the fuel bowl. This retards the flow of fuel through the metering systems and thus permits the carburetor to operate on leaner part throttle mixture ratios.

The rotation of the throttle shaft controls the economizer system. During part throttle operation from about one-quarter to three-quarters throttle, the passages are open and the pressure in the fuel bowl is lowered. This retards the flow through the main jet and a leaner mixture is supplied. On full throttle opening the passages are closed and the main jet flows to full capacity to supply the richer mixture required.

CHOKE SYSTEM

The choke system consists of a valve mounted on a shaft located in the air entrance and operated externally by a lever mounted on the shaft. The choke valve is used to restrict the air entering the carburetor. This increases the suction on the jets when starting the engine. The choke valve is of a "semi-automatic" type, having a poppet valve incorporated in its design, which is controlled by a spring.



CHOKE SYSTEM
Fig. S-27

The poppet valve opens automatically when the engine starts and admits air to avoid **over-choking** or **flooding** of the engine. The mixture required for starting is considerably richer than that needed to develop power at normal temperatures. As the engine fires and speed and suction are increased, the mixture ratio must be rapidly reduced. This change is accomplished through adjustment of the choke valve and the automatic opening of the poppet valve to admit more air when the engine fires.

SERVICE AND REPAIR PROCEDURE

A. IDENTIFY CARBURETOR

(a) Check the numbers on metal identification disc riveted to top of float bowl cover against carburetor outline specification chart. The inside number next to the rivet is the Zenith outline assembly number and the one next to the outer edge of the disc is the vehicle manufacturer's.

B. DISASSEMBLED VIEW

(a) The disassembled view will identify the various component parts and show their relation to assembly. Use the disassembled view with the identifying part numbers to identify and locate parts when performing the disassembly and reassembly operations.

C. SELECTION OF TOOLS AND REPAIR PARTS KIT

(a) The use of the proper Zenith tools and the proper repair parts kits is essential if the best service and repair procedure is to be preformed on the carburetor. The following list of Zenith special tools and general hand tools will best perform the service job.

(b) **Zenith Special Tools**

C161-1	Main Jet Wrench
C161-10	Plug Wrench
C161-25	Main Discharge Wrench
C161-71-1	Line Reamer
C161-72-1	Bushing Driver
C161-73-1	Counter Bore Reamer
C161-82	Fuel Valve Seat Wrench
C161-83	Main Jet Wrench

(c) **General Hand Tools**

7/16" Open End Wrench
1/2" Open End Wrench
1/4" Blade Screw Driver
Long Nosed Pliers
6" Depth Gage
1/4" Round File
Light Hammer
Long Rod or Punch

SECTION S, FUEL SYSTEM

(d) The basic repair parts kit for the 61 or 161 carburetor, except model 61A8SRD, is No. K501. A proper repair job cannot be performed, however, by using the basic kit as such. The basic kit must be "tailored" to fit the particular outline of the carburetor being serviced by the addition of the parts listed in large print on the label of the basic kit container.

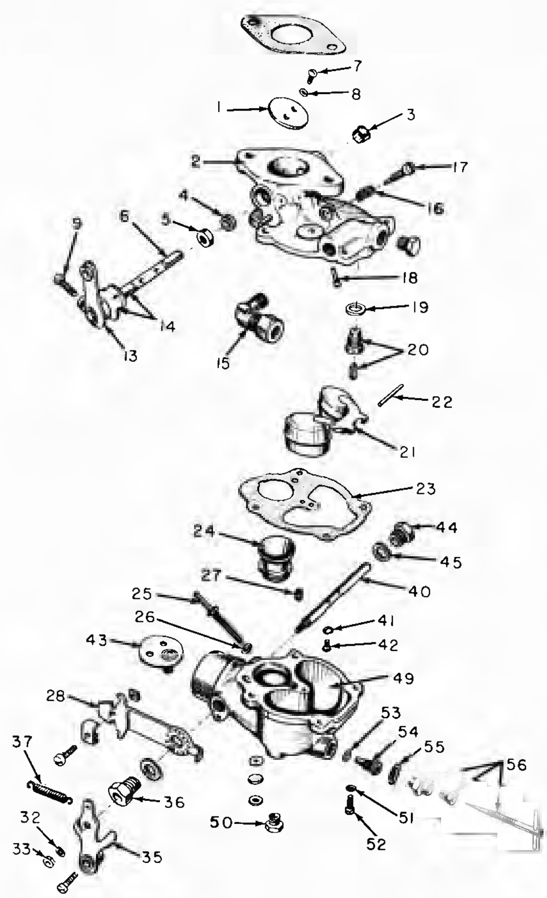


Fig. S-28

D. SEPARATE CARBURETOR BODIES

(a) Remove the hex plug or filter screen (15) from side of throttle body (2) using a 7/16" wrench.

(b) Remove the four assembly screws (52) and lockwashers (51) which attach the throttle body (2) to the fuel bowl (49) using a screwdriver.

(c) Separate the throttle body (2) from the fuel bowl assembly (49).

E. DISASSEMBLE THROTTLE BODY

(a) Remove float axle as follows:

(1) Press screwdriver against float axle (22) at slotted side of float hinge bracket and force through hinge bracket.

(2) Remove float axle (22) completely with fingers from opposite side and remove float (21).

(b) Remove fuel valve needle (20).

(c) Remove the assembly gasket (23) from the machined surface of the throttle body (2).

(d) Remove the venturi (24).

(e) Remove the fuel valve seat (20) and fibre washer (19) from machined surface of throttle body (2) using Zenith Tool No. C161-82.

(f) Remove the idle jet (18) from passage in machined surface of throttle body (2) near fuel valve seat (20) using a small screwdriver.

(g) Remove the idle adjusting needle (17) and friction spring (16) from the side of throttle body (2).

(h) Remove the throttle plate (1), screws (7), lockwashers (8), shaft and stop lever assembly (14),

(1) Unscrew throttle stop screw (9) until threaded end is flush with lever (13).

(2) Make match marks with file on throttle body (2) and all levers to act as a guide to reassemble these parts in the same position as removed.

(3) Loosen throttle clamp lever screw (11) and remove lever (10) from shaft (14). NOTE: Some 161-J Series Carburetors have the throttle lever and the throttle stop lever riveted together. Omit Step No. (3) if this type lever is used.

(4) File off the riveted or peened end of the throttle plate screws (7).

NOTE: When such screws are riveted or peened the threaded end of the two screws must be filed flat before removal to avoid breakage or stripping of threads in the shaft. In some cases it may be necessary to use a small (¼") round file and cut slightly below the surface of the shaft because of a slight counter bore around the screw hole.

Be sure to avoid striking and cutting the side of the throttle body bore or the throttle plate when filing the screws.

(5) Remove the screws (7) and pull out the throttle plate (1).

(6) Remove the throttle shaft and stop lever assembly (14) from the throttle body (2).

(i) Remove the throttle shaft packing (4) and packing retainer (5) from the throttle body shaft holes as follows:

(1) Screw a 5/16" fine thread taper tap into packing retainer (5) until it is firmly seated.

(2) Insert long punch or rod through opposite shaft hole and drive punch against the end of the tap until retainer (5) is free of the body. (Repeat operation for other packing and retainer.)

NOTE: **Do not disassemble the throttle plate (1), throttle shaft and stop lever assembly (14), throttle packing (4), and packing retainer (5) from the throttle body (2) unless the throttle shaft is bent or otherwise damaged or unless there is damage to any of the other component parts of the throttle assembly.**

SECTION S, FUEL SYSTEM

F. DISSASEMBLE FUEL BOWL BODY

(a) Remove the main jet adjusting needle assembly (56) and fibre washer (55) from bottom of fuel bowl body (49) using a ½" wrench.

NOTE: Some models will have a ½" plug (hex) in place of the adjustment.

(b) Remove the drain plug (hex) (50) from outside bottom of fuel bowl (49), using Zenith Tool No. C161-10.

(c) Remove main jet (54) and fibre washer (53) from threaded passage in bottom side of fuel bowl (49) with Zenith Tool No. C161-1.

(d) Remove main discharge jet (25) and fibre washer (26) from center of large opening in machined surface of fuel bowl (49) with Zenith Tool No. C161-25.

(e) Remove well vent jet (27) from center of large opening in machined surface of the fuel bowl (49) with a small screwdriver.

(f) Disassemble choke as follows:

(1) Remove the bracket spring (37) from the choke lever (35) and choke bracket (28).

(2) Make match marks with a file on air shutter bracket (28), air intake body (49) and lever (35) to act as a guide to reassemble these parts in the same position as removed.

(3) Remove the choke shaft nut (33) and lockwasher (32) using Zenith Tool No. C161-25.

(4) Remove the choke lever (35).

(5) Remove the choke bracket screw (36) using a ½" open end wrench and remove choke bracket (28).

(6) Remove the shaft hole plug (44) and fibre washer (45) using a ½" open end wrench.

(7) Remove the choke plate screws (42) and lockwashers (41) and remove the choke shaft (40) and choke plate (43).

NOTE: Some models of the Zenith 161-J Series carburetor employs choke shaft packing washers (39) and packing washer retainers (38) in the choke shaft holes around the choke shaft. The disassembly of these packing washers and retainers should be performed in the same manner as the disassembly of the throttle shaft packing washers and retainers which is described in detail in the disassembly of the throttle body.

NOTE: **Do not disassemble the choke assembly bracket (28), lever (35), shaft (40) and plate (43) unless there is damage to any one of the above mentioned parts or damage to any of the other component parts of the choke assembly.**

CLEANING AND INSPECTION OF PARTS

A. CLEANING PARTS

(a) Clean all metal parts thoroughly with cleaning solution and rinse in solvent.

(b) Blow out all passages in the air intake and fuel bowl casting (49) and throttle body (2). **NOTE:** Be sure all carbon deposits have been removed from throttle bore and idle port. It is advisable to reverse flow of compressed air in all passages to insure that all dirt has been removed. Never use a wire or drill to clean out jets.

B. INSPECTION OF PARTS

(a) **Float Assembly.** Replace float assembly (21) if loaded with gasoline, damaged, or if float axle bearing is worn excessively. Inspect top side of float lever for wear where it contacts fuel valve needle. **NOTE:** Such wear can affect the float level.

(b) **Float Axle.** Replace if any wear can be visually detected on the bearing surface.

(c) **Fuel Valve Seat and Needle Assembly.** Always replace fuel valve seat and needle (20) because both parts wear and may cause improper float level.

(d) **Idling Adjusting Needle and Spring.** Inspect point of needle (17). This must be smooth and free of ridges.

(e) **Throttle Plate.** Inspect plate (1) for burrs or damaged edges. Never clean a throttle plate with a buffing wheel or sharp instrument.

(f) **Choke Plate (43).** Inspect for bends, burrs or damaged edges.

(g) **Choke Shaft.** Check bearing surfaces for wear; see that shaft (40) is straight.

(h) **Gaskets.** Replace all gaskets and fibre washers every time the carburetor is disassembled.

(i) **Throttle Shaft.** Replace if throttle shaft (6) shows evidence of wear on the bearing surfaces.

(j) **Check Specifications.** Use the outline specification chart and verify the correctness of the following parts. Numbers shown on chart will be found on parts. The following calibrated parts should be checked: **Venturi, Main Jet, Discharge Jet, Well Vent Jet, Idling Jet** and **Fuel Valve Seat.**

REASSEMBLY

A. FUEL BOWL BODY

(a) Choke Assembly

(1) Install the two choke shaft packings (39) and retainers (38) in fuel bowl body (49) as follows. Use bushing driver tool Zenith C161-72-1.

(2) Assemble packing (39) and retainer (38) and place completed assembly on bushing driver tool with packing facing small end of tool.

SECTION S, FUEL SYSTEM

(3) Insert small end of tool into choke shaft hole, start retainer (38) into counter bore in body (49) and lightly drive retainer (38) into body (49) until it is flush with machined surface.

(4) Insert choke shaft (40) into air intake (49).

(5) Insert choke plate (43) into air intake (49).

NOTE: Be sure the choke plate (43) is located in the same position in the air intake (49) as regards the poppet valve as when it was disassembled.

(6) Install choke plate screws (42) and lockwashers (41) using a small screwdriver.

(7) Install the shaft hole plug (44) and fibre washer (45) and tighten using a ½" open end wrench.

(8) Place the choke bracket (28) against the boss on the air intake (49) and install the choke bracket screw (36) and tighten with a ½" open end wrench.

(9) Place the choke lever (35) on the choke shaft (40) and tighten with the choke shaft nut (33) using Zenith Tool No. C161-25.

(10) Attach the choke lever spring (37) to the choke bracket (28) and the choke lever (35).

NOTE: Use the "Match Marks" put on the choke lever (35), choke bracket (28) and air intake body (49) during disassembly to properly align the choke assembly during reassembly.

(b) Install main discharge jet (25) and fibre washer (26) in fuel bowl (49) and tighten firmly with Zenith Tool No. C161-25.

(c) Install well vent jet (27) in fuel bowl (49) and tighten with a small screwdriver.

(d) Install main jet (54) and fibre washer (53) in large threaded passage beneath the fuel bowl (49) using Zenith Tool No. C161-1.

(e) Install the drain plug (hex) in threaded passage bottom of fuel bowl using Zenith C161-10 wrench.

(f) Install main jet adjustment (56) or ½" hex plug (57) as the case may be.

B. THROTTLE BODY

NOTE: Any throttle body of a Zenith 161 Series carburetor can have throttle shaft bushings installed to return it to factory specifications as regards fit of the throttle shaft. If the fit of the throttle shaft is sloppy in the throttle body and it is desired to use the same throttle body for reassembly of the carburetor, then, it is absolutely necessary to install throttle shaft bushings. A poorly fitting throttle shaft upsets idling of the engine, for the throttle plate will not be correctly located in reference to the idle discharge port, and also it is possible for additional air to be admitted into the throttle body around the shaft which will also tend to upset the idle.

The following procedure should be adhered to to properly install throttle shaft bushings in the Zenith 161 Series carburetor.

(a) Install throttle shaft bushings as follows:

NOTE: To properly rebush the throttle body of the Zenith 161 Series carburetor, it is absolutely necessary to have available the proper counterbore reamer and line reamer and the bushing driver tool needed to install the new bushing. Counterbore reamer No. C161-73-1, line reamer No. C161-71-1, and bushing driver No. C161-72-1 are used. The bushing itself is CR9-13. After the new throttle shaft bushing is in place it will be necessary to redrill the economizer restriction located in the cover and the channel from the throttle body bore into the throttle shaft hole.

To obtain the correct drill sizes for this operation consult the specification card covering the particular outline in question. To drill the channel from the throttle body bore into the throttle shaft hole it will be necessary to remove the brass channel plug in the throttle body. This can be drilled out using a 3/32" drill and a new "oversize" plug (No. CR137-10) should be installed after the drilling operation is completed.

The throttle body should not be rebushed if the extent of wear of the throttle body and shaft does not warrant it. However, if the wear is severe enough to warrant a rebushing job the following procedure should be followed:

(1) Place a suitable center in the drill press bed With one throttle shaft hole on this center bring the spindle down until the counterbore reamer contacts the opposite shaft hole. The reamer in this instance is of a diameter to result in a press fit for the outside diameter of the throttle shaft bushing.

(2) With the casting still in place as described in the above paragraph, set the stop on the press to the length of the bushing. This will give you the approximate setting of the spindle travel.

(3) The hole is then counterbored to accommodate the bushing.

(4) A throttle shaft bushing is driven into place using the proper bushing driver tool.

(5) And this bushing is then reamed with the line reamer. Use the opposite shaft hole as a "pilot" to "align" the line reamer in the bushing.

(6) Now turn the casting over and prepare the opposite hole to take the bushing. It will be necessary to reset the stops on the spindle again as described before. Then counterbore the hole.

(7) Drive the second throttle shaft bushing into position.

(8) Then line ream the inside diameter as the final machining operation.
The casting is now ready for reassembly.

NOTE: A lathe may be substituted for the drill press in performing the counter-boring and line reaming operations.

(b) Install the two new throttle shaft packings (4) and retainers (5) in throttle body (2) as follows: Use bushing driver tool Zenith C161-72-1.

(1) Assemble packing (4) and retainer (5) and place completed assembly on bushing driver tool with packing facing small end of tool.

(2) Insert small end of tool into throttle shaft hole, start retainer (5) into counter-bore in body (2) and lightly drive retainer (5) into body (2) until it is flush with machined surface. NOTE: The packing retainer (5) must be flush with machined surface or slightly below to avoid striking throttle lever (13).

(c) Install the throttle shaft and stop lever assembly (14), throttle plate (1), screws (7) and lockwashers (8) as follows:

(1) Insert the throttle shaft and stop lever assembly (14) in throttle body (2).

(2) Rotate throttle shaft (6) to wide open position, insert throttle plate (1) and rotate to closed position holding the plate in position with fingers.

(3) Start throttle plate screws (7) and lockwashers (8) and tighten with small screwdriver, being sure that the throttle plate (1) is properly centered in the throttle body bore.

NOTE: The screw holes in the throttle plate are off center. Start the side of the throttle plate with the shortest distance between the screw holes and beveled edge into the shaft first. The throttle plates are made with two opposite edges beveled to fit the throttle body bore when the plate is closed. The throttle plate will not close tightly if installed upside down. To properly center the plate in the throttle body bore, the screws should be started in the shaft and then with the plate closed, it should be tapped on the mounting flange side. Pressure on the plate must be maintained with the finger until the screws are tightened. When properly installed, the side of the throttle plate **farthest away from the mounting flange** will be aligned with the idle port when the plate is closed.

(d) Install throttle clamp lever in same position as removed. Refer to match marks placed on lever and throttle body during disassembly step.

(e) Install idle adjusting needle (17) and friction spring (16) in threaded passage on side of throttle body (2). Seat lightly with screwdriver and back out 1¼ full turns.

(f) Install idle jet (18) in counter-bored passage in machined surface.

(g) Install fuel valve seat (20) and fibre washer (19) using Zenith Tool No. C161-82.

(h) Place new throttle body to fuel bowl gasket (23) on machined surface of fuel bowl cover (2).

(i) Install fuel valve needle (20) in seat (20) followed by float (21) and float axle (22).

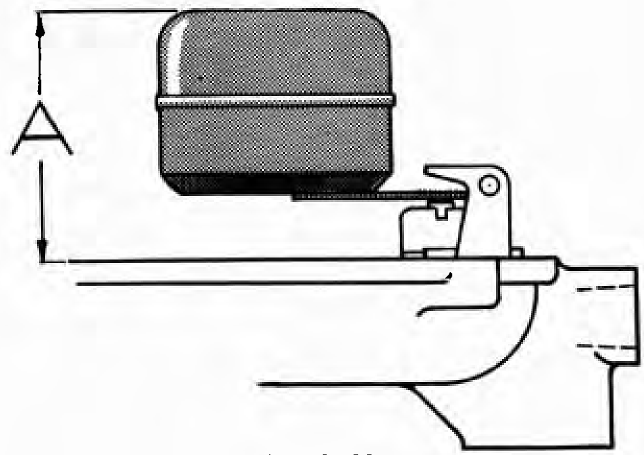


Fig. S-29

The "A" dimension should be 1 5/32" plus or minus 3/64".

(j) **Float Level.** Check position of float assembly for correct measurement to obtain proper float level using a depth gage. Obtain float setting measurement from outline specification chart. **NOTE: Do not bend, twist or apply pressure** on the float bodies.

(1) With bowl cover assembly (2) in an inverted position, viewed from free end of float (21) the float bodies must be centered and at right angles to the machined surface. The float setting is measured from the machined surface (no gasket) of cover to top side of float bodies at highest point.

(2) **Bending Float Lever.** To increase or decrease distance between float body and machined surface use long nosed pliers and bend lever close to float body. NOTE: Replace with new float if position is off more than 1/16".

(k) Insert venturi (24) in throttle body bore, large opening first.

C. ASSEMBLE CARBURETOR BODIES

(a) Assemble the two completed bodies (2 and 49) and four screws (52) and lockwashers (51) and tighten screws evenly and firmly.

(b) Install the hex plug or filter screen (15) in threaded passage in throttle body (2). (C161-10 wrench.)

(c) Hold the throttle lever (13) in a closed position and turn the throttle stop screw (9) in until it just contacts the stop on body (2), then turn screw (9) in 1½ additional turns.

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