INSTRUCTION No. 100

ZENITH CARBURETORS: Principle of Operation; The Compensating Jet and Compound Nozzle; Theory Applied in Zenith Practice; Installing, Adjusting and Checking a Zenith Carburetor; Carburetor Adjustments; Servicing and Maintenance of the Zenith; Zenith Model SV; Care of the Carburetor; Factors Which Assist Good Carburetion.

PRINCIPLE OF THE ZENITH CARBURETOR[1]

The Zenith Carburetor is a plain-tube type of carburetor with fixed adjustments.

In order to make clear the principle[2] of this carburetor, simplified illustrations and explanation are given below taken from the Zenith pamphlet entitled "The Balanced Ration."

The Balanced Ration

Just as the food we eat must contain the right proportions of carbo-hydrates, proteins, fats, etc., in order to keep the body working at its highest efficiency, so, the automobile **engine must be fed exactly the right proportions of gasoline and air,** in order that it may function properly.

In each case, the highest pitch of efficiency—the Zenith—is reached only by means of a perfectly balanced ration. Appetites may vary, greater exertion of either the human body or the automobile engine will call for a **larger ration; but always the ration must be balanced,** must contain the same kinds of foods in the same proportions in order to produce the best results.

Few of us devote very much real thought to the subject of diet. We prefer to leave the matter to those in charge of the kitchen, whose particular task it is to see that we are supplied with the various foods in the proper quantities to form the balanced ration necessary to sustain our energies.

The engine too is dependent upon its kitchen. Its cylinders take in and digest the food and turn it into energy just as the human stomach does, but before the food reaches the cylinders it must be measured out, the proper proportions of fuel and air must be brought together and mixed thoroughly and so prepared for the engine's consumption. The device that performs this function—the link between the raw food and the prepared meal—the kitchen, in fact, which supplies the engine with its balanced ration—is the carburetor.

The Ordinary Ration

The simple carburetor: A simple carburetor is one having a fuel chamber, a single air entrance and a single jet (see Fig. 1). Suction, created by the pumping of the pistons, causes fuel and air to flow through the carburetor into the engine. Each alternate downward stroke of a piston draws a fresh charge of mixed fuel and air from the carburetor into its own particular cylinder, where it is compressed and exploded.

The simple carburetor won't do. However, fuel is more responsive to suction than is air. Consequently as the engine gathers speed the flow of fuel into the engine increases much faster than the flow of air, the mixture becoming too rich. **It is no longer the perfectly balanced ration which the engine needs in order to do its best work.**

Attempts to overcome the defects: More speed should be a matter of a larger ration, not a richer ration. Many attempts have been made to overcome this natural tendency of the mixture supplied by the simple carburetor to become rich. However, due to mechanical difficulties or sensitiveness to changeable atmospheric and temperature conditions many of these devices have proven unsatisfactory.

How the defects were overcome: The French scientist, M. Baverey, inventor of the Zenith carburetor, solved the problem of the "balanced ration" by taking the direct and natural method of so arranging the fuel jets that they accurately proportion the fuel flow to the air flow in accordance with the suction. **He used natural methods, not mechanical methods.**

To overcome the variation of the simple jet which allows the mixture to grow richer under increasing suction, Baverey introduced another, calling it the **compensating jet,** which has exactly the opposite effect, allowing the mixture to grow "poorer" under increasing suction. He then combined the two jets into one—the **compound nozzle**—and achieved the desired result, a carburetor which delivers at all engine speeds a mixture containing exactly the right proportions of air and fuel—**the perfectly balanced ration.**

How Zenith Balances the Ration

In Zenith carburetors there are four measuring parts, supplied to meet the exact requirements of any particular engine:

1. The **choke tube** (**X**) (Fig. 4)—This measures the amount of air taken into the engine. The flow of air increases as the engine speed increases.

2. The **main jet** (8) (Fig. 4)—This acts exactly like the jet in the simple carburetor. It varies in flow with the suction.

3. The **compensating jet** (6) (Fig. 4)—The flow from this jet is constant regardless of the amount of suction, or the speed of the engine.

4. The **idling jet** (2) (Fig. 4)—This operates only when the throttle is barely cracked open. Further opening of the throttle automatically puts the idling device out of operation because the fuel in the well is then all drawn through the cap jet (4) (Fig. 4).

How the Main Jet Acts

Look at Fig. 1. You will see that (**G**), the main jet, is directly connected with the fuel chamber (**F**).

Compare the fuel chamber to a bottle and the main jet to a straw.

Now, if you put a straw down to the bottom of a full bottle (Fig. **1A**), you will find that the harder you suck on the straw the more liquid you will get.

The suction of the engine will act on the fuel in the bowl through the main jet the same as your suction on the straw acted on the liquid in the bottle.

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[1] Reprinted from Zenith instruction booklets.

[2] See also pages 130, 131 of *Dyke's Auto Encyclopedia*.

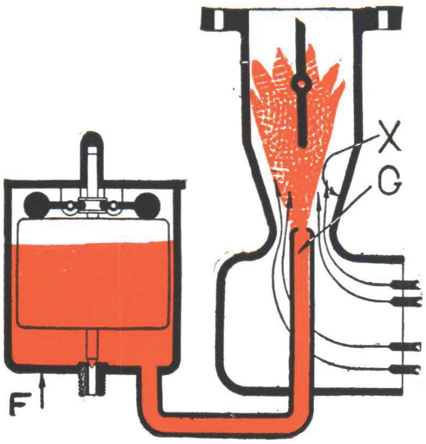


Fig. 1.

Fig. 1A.

How the Compensating Jet Acts

Look at Fig. 2. You will see that (I), representing the compensating jet, empties into the well (J), which is open to the air.

The cap jet (**H**) connects with this well.

Compare well (**J**) to a glass, compensating jet (**I**) to a bottle, and cap jet (**H**) to a straw.

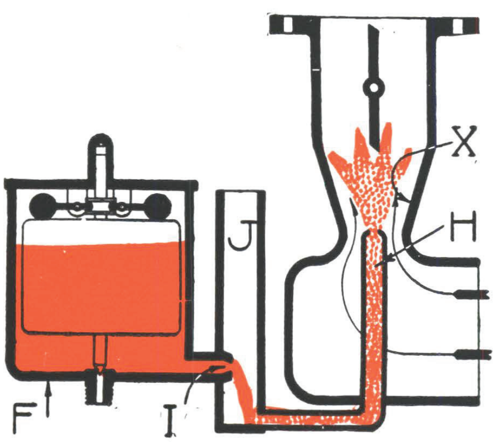


Fig. 2.

If you pour a tiny stream of liquid into a glass from a bottle, Fig. **2A, you** can only suck out from the glass as much liquid as the tiny stream allows you, no matter how hard you suck on the straw.

It is apparent, therefore, that regardless of the suction at the tip of cap jet (H) only as much fuel will

Fig. 2A.

be drawn through it as is emptied into well (J) by the compensating jet (I).

As the flow through the compensating jet is constant, it follows then, also, that the flow through the cap jet is constant.

The Compound Nozzle

Look at Fig. 3. You will see Figs. 1 and 2 combined. In this view cap jet (**H**) surrounding main jet (**G**) forms what we call "the compound nozzle."

Combining the first straw, or jet, that gave more liquid under increasing suction, with the second straw, or jet, which gives the same amount of liquid regardless of the amount of suction, you have a compound feed or nozzle.

This will permit the total flow of liquid to increase only within definite limitations and, by varying the size of the straws, or jets, you can bring the rate of flow absolutely under your control.

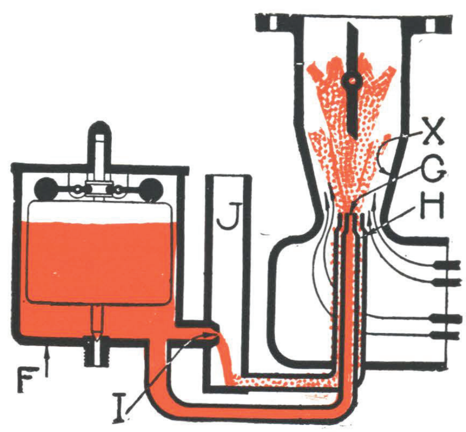


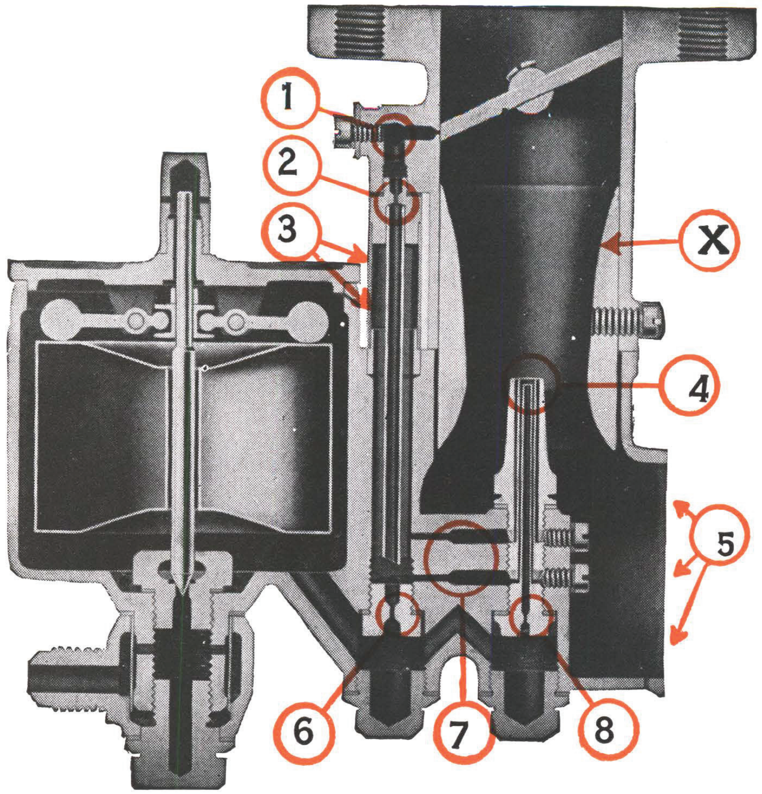
Fig. 3.

How Theory Is Applied in Zenith Practice

The illustration, Fig. 4, shows a sectional view of the model "U" Zenith carburetor.

Number 8 is the main jet. Follow it and its connections and compare with diagrammatic view shown in Fig. 1.

Number 6 is the compensating jet. Compare it with the view shown in Fig. 2. The jet here acts the same as (I) in Fig. 2, emptying into the well above it. This well is open to the air at Number 3.



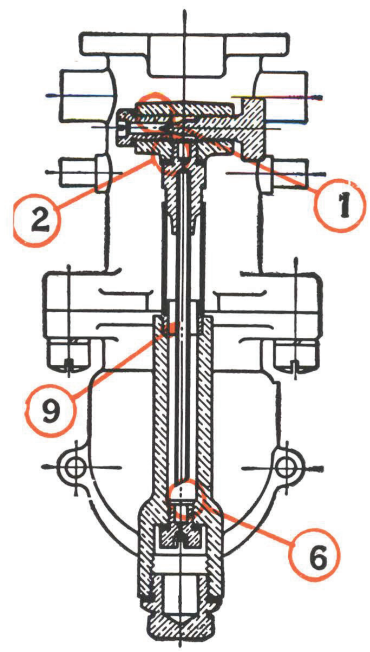


Fig. 5. View showing detail of the idling and starting jet. (See further explanation on pg. 1295 under "Idling and Starting Jet.")

Fig. 4. Sectional view of the Zenith model "U" carburetor.

Name of parts: 1, idling jet passage; **2,** idling jet; **3,** opening to compensating jet; **4,** cap jet; **5,** air intake; **6,** compensator; **7,** compensator jet passage; **8,** main jet; **9** (see Fig. 5) idling tube; **X,** venturi or choke tube (note there is only one venturi here, whereas on the model "SV" pages 1297, 1298, there are two venturi, a small and a large one).

The **single venturi carburetor** is used considerably on small engines, requiring in most instances 1″ outlets. On larger engines, requiring 1¼″ sizes up, the **double venturi carburetor**, such as the model "SV" is used considerably.

Fig. 6

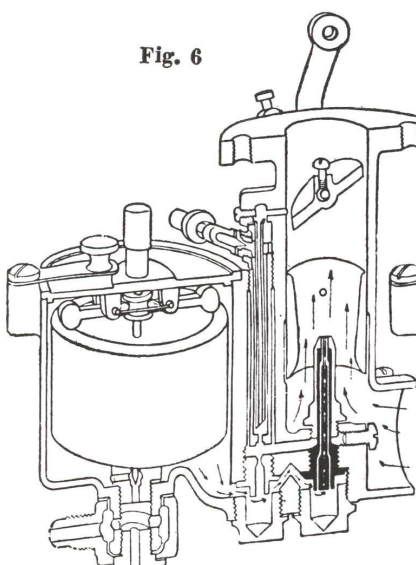


Fig. 7

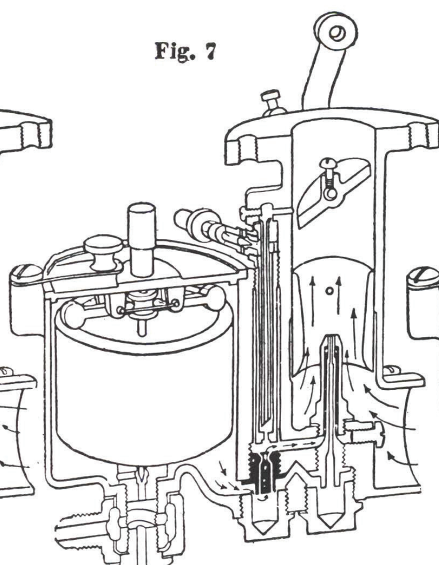


Fig. 8

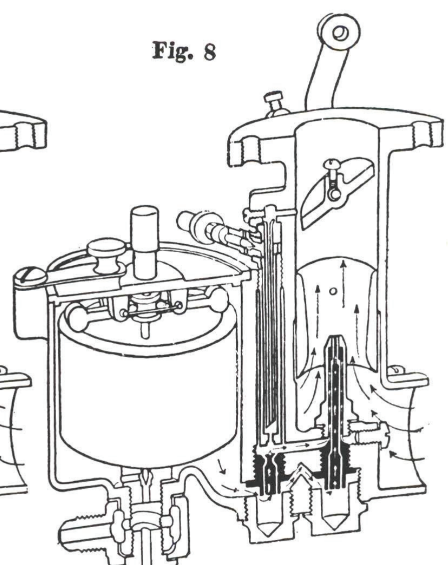


Fig. 6. **The main jet is shown in black.** This receives gasoline direct from the carburetor bowl, so gives an increasingly rich mixture as the suction increases.

Fig. 7. **The compensating jet is shown in black.** The gasoline flowing through this is limited only by the size hole through it, giving a constant flow of fuel when the suction—and consequently the air—is increased.

This means a leaner mixture as the gas suction is increased.

Fig. 8. **The compound nozzle** (the main and compensating jets) **is shown in black** and both are in actual operation, both jets supply gasoline, one growing richer, one leaner, as greater demand is made on the carburetor by the engine.

By selecting the proper sizes of main and compensating jets for any given installation, the relation of total gasoline to air drawn through the carburetor can be kept constant and exactly correct at all engine speeds.

From this well, through passages Number 7, the fuel flows to the (in this case) double cap jet. This is formed by the two outer pieces under Number 4.

Number 5 designates the main air intake of the carburetor. The amount of air necessary to meet the demands of the engine is measured through the choke tube (**X**) (see Fig. 4).

This is seen as the restricted tube held in place by the set screw just above the compound nozzle.

Idling and Starting Jet

This idling jet (2) (Fig. 5) is an auxiliary to the compound nozzle and operates only when the throttle is just cracked open.

The idling tube (9) projects downward to the bottom of the well which is filled with fuel when the engine is at rest.

Cranking the engine causes a strong suction over the throttle which, acting through the idling jet (2) and tube (9), draws fuel, and through idling air valve (1) draws air, forming the proper mixture for starting and idling the engine.

When the engine is **idling the well** is about half full of fuel. **This provides a reserve for acceleration as, when the throttle is open,** this fuel rushes through passages (7) Fig. 4, to balance the air passing by the compound nozzle.

Practice

The Zenith principle, illustrated and explained in preceding pages, is incorporated in every Zenith carburetor.

The illustrations (Figs. 6, 7, and 8) show how it is adapted to actual working conditions, through the use of parts governing the flow of air and gasoline which can be varied to meet individual requirement, but which become integral parts of the carburetor not subject to mis-adjustment.

INSTALLING, ADJUSTING, AND CHECKING A ZENITH CARBURETOR[1]

The type and size of carburetor to be used can be determined from the one to be replaced, or by measuring inlet manifold opening and refer to Fig. 9 and table below.

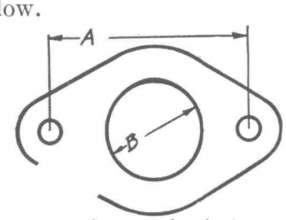


Fig. 9

Carburetors come in nominal sizes having actual diameters of barrels (**B**) and distance between bolt hole centers in flanges (**A**) as follows:

Nominal Size	Actual Size (B)	Bolt Center (A)
7/8″	1 1/16″	2 1/4 ″
1 ″	1 3/16″	2 3/8 ″
1 1/4″	1 7/16″	2 11/16″
1 1/2″	1 11/16″	2 15/16″
1 3/4″	1 15/16″	3 5/16″
2 ″	2 3/16″	3 9/16″

Model and size are designated by the marking on carburetor. The **model** appears in **letters** and the **size** in **figures. For example,** ST-4, or U4 means a model ST or U carburetor 1″ size.

The **different figure markings** and corresponding **sizes** are as follows: the figure marking 3½ means ⅞″ size; 4, 1″ size; 5, 1¼″; 6, 1½″; 7, 1¾″; 8, 2″.

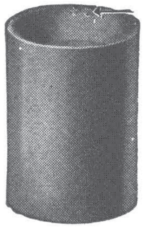
There are two main types—the **vertical** which hangs from the manifold; and the **horizontal** which bolts to the side of the cylinder block.

Carburetor Adjustment

The following instructions will enable you to figure out what is necessary to **correct an adjustment.**

To correctly and quickly work out the adjustment you need to know what to change to accomplish a certain result and, at the same time, what effect that change will have on other points of operation.

Note the following carefully and you will have little difficulty in "working out" or correcting an adjustment.



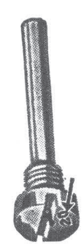


Fig. 10 (left). Choke tube or venturi.

Fig. 11 (right). Main jet.

[1] From Zenith carburetor instruction book (Zenith-Detroit Corporation, Detroit, Mich.). These instructions can also be **used to check carburetors already** installed in order to see if they have the proper size choke tube, main jet, and idling jet.

Fig. 10. **Choke tube or venturi (arrow shows where size is stamped in millimeters).** Its job is to measure the air through the carburetor. In size it should be **large enough** to supply all the air needed for maximum speed, and **small enough** to keep the air moving fast enough at low speed to completely atomize the fuel.

Fig. 11. **Main jet** (**size stamped on base**). This is the long jet (8) Fig. 4, page 1294. It is directly connected with the float chamber and will vary in amount of fuel flowed with the speed of the engine. Its effect is most noticeable at high speed.

In the **older types** of carburetors such as Models L, O, and HP, its size is marked in 1/100ths of a millimeter.

In the **later types** the mark signifies the number of 1/100ths of a millimeter divided by 5.

Examples of Markings of Jets

Model L (old model) main jet, having a hole 1 millimeter in diameter, is $\frac{100}{100}$ millimeters and consequently marked 100.

Model U (later model) main jet, having a hole 1 millimeter in diameter, is $\frac{100}{100}$ millimeters and as $100 \div 5 = 20$, therefore it is marked 20.

The main jets are made in various sizes progressing in steps of 5/100ths of a millimeter.

Model L (old model) main jets come in sizes as low as 60 up to as high as 250, and in this order—100–105–110, etc.

Equivalent sizes of Model U, ST, and SV (later model) main jets would be from 12 up to 50, and in this order—20–21–22–23.

See Tables on page 1296 for sizes to use.

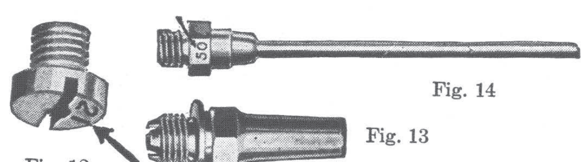


Fig. 14

Fig. 13

Fig. 12.

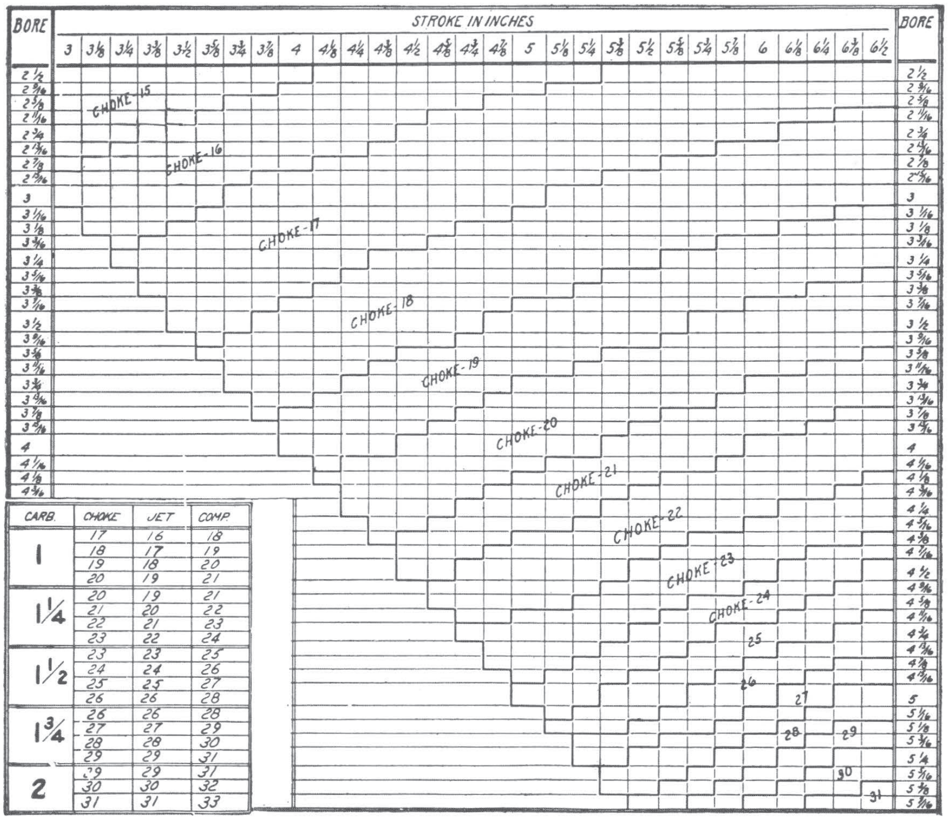
Fig. 12. **Compensating jet** (left) (**size stamped on base**). This is the short jet (6) (Fig. 4, page 1294).

It empties into the well (J) (Fig. 3, page 1293) which is open to the atmosphere and accordingly is not affected by the suction.

It flows the same amount of fuel at all speeds but its effect is most noticeable at low speed such as climbing a hill or pulling through deep sand and mud and in acceleration. The **compensating jets are drilled** in the same manner as the main jets.

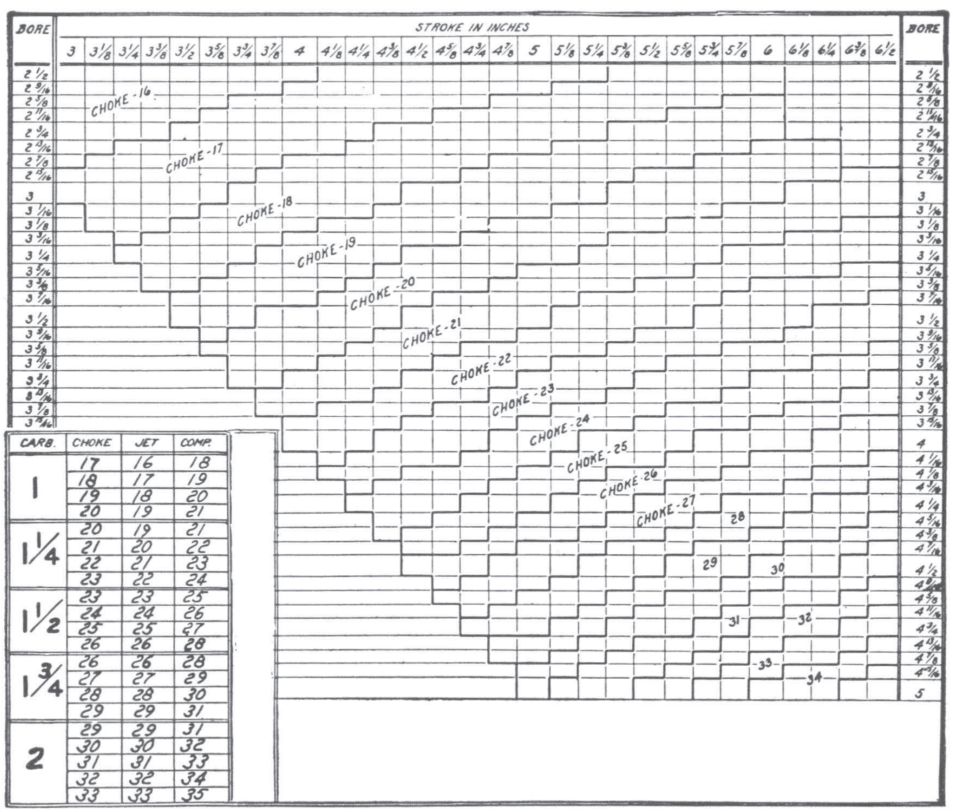
Fig. 13. **Cap jet.** This is not a measuring jet and bears no mark and is made in one size only. The fuel measured through the comp. jet goes through channel hole (7) (Fig. 4) and out of cap jet into carburetor barrel (the barrel is that part which holds the choke tube and throttle valve).

Fig. 14. **Idling jet** (**size stamped on nut at top**). This is the jet (2) (Fig. 4) and its sole function is to supply fuel for closed throttle operation. Immediately the **throttle is opened it is put out of action** as the fuel goes into carburetor through cap jet.



CARB.	CHOKE	JET	COMP.
1	17	16	18
	18	17	19
	19	18	20
	20	19	21
1¼	20	19	21
	21	20	22
	22	21	23
	23	22	24
1½	23	23	25
	24	24	26
	25	25	27
	26	26	28
1¾	26	26	28
	27	27	29
	28	28	30
	29	29	31
2	29	29	31
	30	30	32
	31	31	33

Fig. 15. Preliminary setting chart for **4-cylinder** engines.



CARB.	CHOKE	JET	COMP.
1	17	16	18
	18	17	19
	19	18	20
	20	19	21
1¼	20	19	21
	21	20	22
	22	21	23
	23	22	24
1½	23	23	25
	24	24	26
	25	25	27
	26	26	28
1¾	26	26	28
	27	27	29
	28	28	30
	29	29	31
2	29	29	31
	30	30	32
	31	31	33
	32	32	34
	33	33	35

Fig. 16. Preliminary setting chart for **6-cylinder** engines. **Note:** For **8-cylinder** engines use the 6-cylinder chart, **adding** two sizes to the recommended choke-tube size, with corresponding jets. See also footnote,[1] page 1297.

Idling Well Sizes

Carb. size	*Well*
1″	40–45
1¼″	45–50
1½″	50–55
1¾″	55–60
2″	60–70

Selecting the Trial Setting

When other data is not available you can refer to the charts[1] on preceding page and select the sizes of chokes and jets for any engine.

How to use charts: To determine the carburetor setting for any given engine first locate the figure at the top of the chart which corresponds with the "stroke" of the engine.

Then locate the figure at the side of the chart which corresponds to the "bore" of the engine.

Follow the stroke column downwards to the point where it meets the lines above and below the figure representing the "bore." This will give you the proper choke size.

By referring to the table in the lower left hand corner of the chart you will find the proper jet sizes to be used with each choke size.

Example: Engine 4 cyl. 3½″ bore, 5″ stroke; choke size 19. The setting of carburetor should then be 19 choke, 18 main jet, 20 compensating jet. (For the older models the main jet and compensating jet sizes will be multiplied by 5; for example, the main jet would be 18×5=90 and the compensating jet 20×5=100.)

Example: Engine 6 cyl. 3½″ bore, 5″ stroke; choke size 21; carburetor setting would be 21 choke, 20 main jet, 22 compensating jet. (For the older models the main jet and compensating jet sizes would be multiplied by 5.)

Note: Owing to the different designs of engines, manifolds, heating devices, etc., it is impossible to construct charts which are absolutely correct, but the preliminary setting charts will give you a setting which will function satisfactorily in the majority of cases. In the few exceptional cases a change of **one size** on either the **main or compensating jet** will usually overcome any trouble.

Trying Out the Setting

Note that these instructions apply to working out a new setting or to the correction of one already installed.

First: Be certain that all **connections** are O.K. and the fuel is turned on.

Second: Back off the lever stop screw all the way and then screw it back in until you know the butterfly is opened a little bit.

Then screw the **idling adjusting needle valve** all the way in to its seat and then back it off about a turn and a half.

Third: Now turn on the switch, close the choker and start engine. When it starts gradually return choker to its open position. Let it run a few minutes until it is well warmed up, then back off the lever stop screw until the engine runs at the desired idling speed, at the same time screwing in or out on the **idling adjusting needle valve,** until the engine is running evenly.

If the idling valve has to be opened more than three complete turns from its seat put in an **idling jet one size smaller.**

If you have to screw it in to within less than a turn from its seat put in a **jet one size larger.**

Fourth: Now by quick opening of the throttle the engine should speed up with no hesitation with spark fully advanced. **If it spits back** or hesitates, put in a **larger compensating jet.** It should "spit-back" a little with the spark fully retarded on quick opening of the throttle.

If it does not, put in a **smaller compensator.**

Fifth: Now take it on the road and try it on a good grade. If it doesn't have power and **seems sluggish, try smaller jets.**

If it **lacks power** but "spits" or "coughs," try **larger jets.**

If changing of jets more than two sizes up or down from what you started with does not give you desired results, change the choke tube according to the following indications:

(a) **If you have to use larger jets to get acceleration** (quick opening of throttle) or power use a **smaller choke.**

(b) **If you get good acceleration but poor power with smaller jets** put in a **larger choke.**

Note: If with a given carburetor adjustment you can quickly accelerate the car or truck without spitting back and climb a good hill without "loading-up" and sluggish action your mixture is pretty near right and the economy will take care of itself.

ZENITH CARBURETOR; SV MODELS

Zenith model "SV" carburetors have three main parts: the **bowl,** which contains the float mechanism and the jets; the **barrel** which contains the two venturis, and the throttle butterfly; and an **air intake,** containing a strangling device and temperature regulator.

Adjustment[2]: Like all Zenith carburetors, "SV" models have a **fixed adjustment.**

The venturi, main jet (**G**), compensating jet (**I**) and idling jet (**P**), whose proper sizes constitute the setting, never vary in size, and once right, stay right (Figs. 17, 18, 19).

Operation: Fuel enters the carburetor through the union body (**D**) and is filtered by the screen (**D** 1) (see Figs. 17, 18).

It enters the bowl through the needle valve seat (**S**), and when it reaches the proper level, raises the float (**F**) in the bowl, which causes the needle valve (**G1**) to stop the flow of fuel.

Idling device: When the butterfly throttle valve is nearly closed, and the engine is "turned over," there is a very strong suction at the edge of the butterfly, where the idling hole is located. Under this condition little or no gasoline is supplied by the **main jet** (**G**) or the **cap jet** above it.

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[1] Applies to all Zenith carburetors except those with double choke or venturi, as models "ST" and "SV." On the "ST" and "SV" double venturi carburetors, **increase** choke 2 sizes, leave main jet the same, and **reduce** compensator jet 2 sizes.

[2] **The adjustments here also apply to the "ST" model.** The difference between the "ST" and "SV" models is that the "ST" is a smaller size and the compensating jet is in the bottom, whereas on the "SV" it is on the side (see **I,** Fig. 19). The "ST" is made in 1″ and 1¼″ size. The "SV" is made in 1¼″, 1½″, 1¾″ and 2″. [3] For **engine bore and stroke** and **make and size carburetor of different engines** see pages 1055, 966, 996.

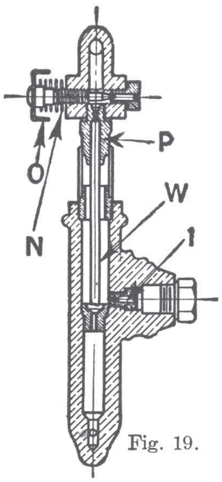


Fig. 19.

Gasoline from the bowl flows through the compensating jet into (I) (Fig. 19) into the idling well (W) and is then lifted by the engine suction through the idling jet (P), which has a calibrated opening at its upper end.

Air is measured through the idling needle valve seat in accordance with the adjustment of the needle valve (O), Fig. 18. **The mixture of gas and air** passes through the idling hole and on into the engine cylinders.

To set the idle, get the engine thoroughly warmed up and then regulate the engine idling speed by turning the throttle lever stop screw (A) in lock nut (B) until the throttle butterfly is opened enough for the speed desired. At the same time manipulate the idle adjusting screw (O) (Fig. 18 or 19) to get the right mixture.

Turning in on the adjustment screw (O) cuts off the air supply and makes the mixture **richer,** while **backing out** the adjusting screw admits more air and makes the mixture **leaner.**

When a satisfactory idle has been obtained, securely lock the throttle lever stop screw (A) in place by means of the lock nut (B) which is attached to throttle lever (Y).

For normal idling speed, the needle valve (O) should be backed out from closed position to from $\frac{3}{4}$ to $1\frac{1}{2}$ turns.

Air connection: The air intake (Fig. 17) is provided with an air strangler valve which is operated by the driver through the "choke" rod.

When closed tight this valve serves as a strangler for starting and when only partially closed, it enriches the mixture for warming up.

Particular care should be taken to insure the strangler butterfly opening fully, and closing tight, when actuated by the control rod.

Starting the engine: When cold, open the throttle "just a crack" and have the dash choke control clear out or at "closed" position. Immediately the engine starts, push choker in part way, and as the engine warms up, move the control gradually in or toward the "open" position. When engine is hot, it should not be necessary to use the choke control at all. Remember that running with the choke in a partially closed position greatly increases the fuel consumption.

Care of the carburetor: Keeping the carburetor free from dirt and water is the only care necessary.

The important parts to be cleaned are the filter screen (D1), the main jet (G), and the compensating jet.

To clean the filter screen, take off the filter plug at the bottom of the bowl with a wrench, remove the union body (D), and pull out the filter screen. Clean the screen with gasoline, or compressed air, and be sure that it has no holes when replaced.

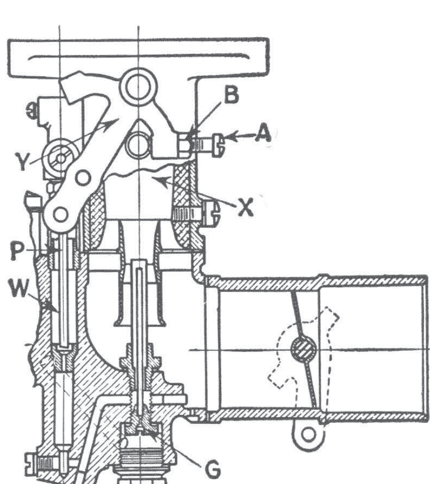
The main jet and the cap jet can be unscrewed when the lower plug and the compensating jet plug on the side have been removed.

If you wish to clean the idling jet (P) (Figs. 17 and 19), remove the screws which hold the bowl to the barrel, and then unscrew the jet. Use compressed air or gasoline to clean the jets. **Never use a wire.**

The carburetor can be taken completely apart and put together again without danger of disturbing the adjustment. Simply be careful that all gaskets are in place and the screws and jets drawn up snugly.

When ordering parts, always give **name of part, model number of carburetor,** and in addition, the name and model of car on which carburetor is used.

It is important to specify the size of the chokes or jets desired. If there is any doubt as to requirements, give full details as to name and model of car, size of engine, (bore and stroke), number of cylinders, size of choke and jets now in carburetor and any installation difficulties which may be apparent. (Manufacturers, Zenith-Detroit Corpn., Detroit, Mich.)



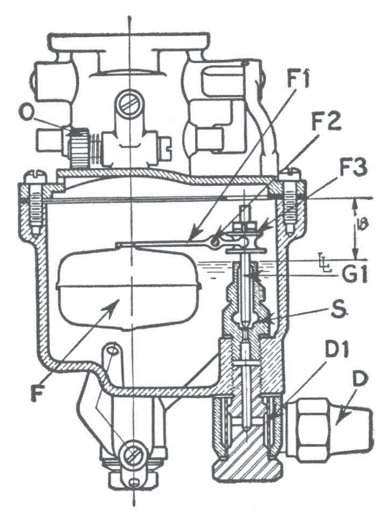


Fig. 17. Section showing barrel and air intake of model SV Zenith carburetor (ST is similar; see footnote,[2] page 1297).

Fig. 18. Section showing bowl and float mechanism of model SV.

Names of parts: A, throttle stop screw; **B,** throttle stop screw lock nut; **D,** gasoline line union nut; **D1,** gasoline strainer; **F,** float; **F1,** float arm; **F2,** float arm axle; **F3,** needle valve collar; **G,** main jet; **G1,** float needle valve; **O,** idling adjustment; **P,** idling jet; **S,** float needle valve seat; **W,** idling tube; **X,** venturi; **Y,** throttle lever.

ZENITH POINTERS ON GOOD CARBURETION AND HARD STARTING

Factors Which Assist Good Carburetion

Ignition spark plug should be set with at least .025″ gap. Many are now using .031″ gap, and some even use .035″. (See also page 1302 for discussion on spark plug gap.)

Interrupter points should be clean and properly set according to manufacturers' specifications. Usually about .015″ to .020″ gap when the points are wide open, with spark lever retarded when TC mark on flywheel is in line with pointer is the approximate average interruptor setting and timing.

Leaky carburetors are in many instances caused by dirt under the float needle valve.

It can usually be removed by alternately raising and lowering it from its seat, at the same time giving it a twisting motion with the fingers.

If the dirt is loose or only slightly embedded this will wash it away.

In aggravated cases, hold the needle valve firmly on the seat with the fingers and, with a light tool, gently tap the top of the valve.

The bearing points of the needle valve and of the needle valve seat are highly polished at the factory. Therefore, **do not try to regrind the seat** as this procedure is in most cases productive of bad results.

If necessary to fit a new needle valve, or needle valve seat, replace both of them with new parts. Never replace one and leave the other in the carburetor. *When any parts of the needle valve or float mechanism are replaced use a level test gauge to adjust the fuel level.*

If the float is leaky and contains gasoline, the additional weight will cause a high level and flooding condition.

If the needle valve counterweights are worn badly, the float can raise too high and will result in flooding. Turn them over, or replace with new weights.

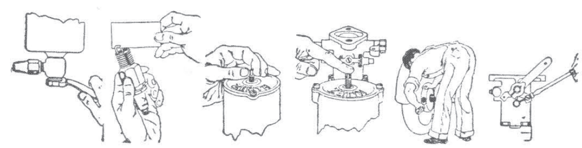
Never raise or lower the fuel level for the purpose of leaning or enriching the mixture.

If, after stopping the engine, a bit of fuel leaks from the carburetor, do not be alarmed. This is only the fuel drawn up into the carburetor barrel and manifold which, due to insufficient suction, does not get to the cylinders. When the engine is stopped, releasing the suction, this fuel naturally drops and is soon drained off through the small hole in the bottom of the carburetor **provided for that purpose.** This is more noticeable in **cold** than in hot weather. Always close the throttle before shutting off the engine. This will usually eliminate this condition, and in other cases reduce the loss to a minimum.

Hard Starting

See if you have fuel in the carburetor. This can be determined by removing the dust cap and pressing down on the needle valve. If the valve **cannot be depressed** by the finger there is fuel in the carburetor.

In the case of F-type carburetors, remove the float cover to see if fuel is in the bowl.



See if you have a good spark at the spark plugs.

Have throttle lever only slightly open, so as to get full effect of the suction on the idling jet and well.

See if strangler valve closes completely.

Check manifold and connections for air leaks.

Be certain starter is turning engine over with sufficient speed to lift fuel to the cylinders (at least 100 r.p.m.).

Check for dirt or water in carburetor and particularly in idling jet.

In cold weather it sometimes happens that water accumulates in the carburetor or fuel line and freezes, thus shutting off the flow of fuel.

Weak compression, riding valves, faulty adjustment of spark plugs and breaker points will make starting hard.

Do not flood the engine with gas. If you do, release the strangler, open the throttle half way and turn the engine over. This will dilute the mixture in the cylinders to a point where it will ignite.

Too much gasoline consumption may result from one or several causes:

Check carburetor adjustment.

Check ignition adjustment.

Check brake adjustment.

Check fuel connections and carburetor for leaks.

Check hot air tubing connections.

Check strangler adjustment.

Check condition and amount of oil in engine, transmission, rear axle, wheel bearings, universal joints, etc.

ZENITH GASOLINE FLOAT LEVEL ADJUSTMENT

The dimensions, given in inches, are the measurement from the top of the machined surface of the float bowl to the fuel itself on the following models and sizes of carburetors:

Models CV14, CV20, CV20C, CV20L, CV20M, $\frac{7}{16}$″; model CV22F, $\frac{33}{64}$″; models L4, L5, L6, L6T, L7, L7T, L8, $1\frac{9}{64}$″; models 03½, 04, 05, Q4C, Q5C, $\frac{25}{32}$″; Model Q6C, $1\frac{9}{64}$″; model T3, $\frac{39}{64}$″; models T3 ½, T4, T4X, T4XF, T4F, T5F, T5XF, $\frac{45}{64}$″; models S4, S4BF, U4, $\frac{45}{64}$″; models S5, S6, U5, U6, $\frac{29}{32}$″; models U5F, U5FL, U5FW, U5FR, $1\frac{1}{32}$″; models UL5, UL6, $\frac{29}{32}$″.

Models SV5, SV6, SV7, SV8, $1\frac{1}{32}$″; models ST4, ST4B, ST4T, ST5, $\frac{45}{64}$″; model T5T, $\frac{45}{64}$″; models T4DS, T4XD, $\frac{29}{32}$″; model US52, $1\frac{37}{64}$″.

Models HF2 ½K, HF3K, HF3KC, HF3A-B, $\frac{39}{64}$″; models HF3 ½, HF3 ½F, HF4A, HF4B, HF5H, $\frac{45}{64}$″; models HP4, HP5, $\frac{25}{32}$″; models HP6A, HP6B, $1\frac{9}{64}$″; models HR20, HR20AM, HR26A, HT3, ½F, $\frac{5}{8}$″; model HT4F, $\frac{45}{64}$″; models HT5HF. HU4A, $\frac{25}{32}$″.

Models O4D, O5D, O6D, O7D, O8D, $1\frac{9}{64}$″; models ER20F, ER26A, $\frac{33}{64}$″; model V4B-SV4, $\frac{45}{64}$″.

Model 48DC, $1\frac{7}{32}$″; models SL6S, SL6L, SL7R, SLRS, $1\frac{9}{64}$″.

To make adjustment, it is necessary to unsolder the needle-valve collar and move it up or down on the float needle valve and then resolder; moving collar away from pointed end slightly lowers the level and toward pointed end raises the level. Models ST and SV can be adjusted by bending the float arm, but this is not considered good practice. All Zenith carburetors bear a scratch-awl mark on the side of float chamber which indicates the gasoline level.

Level test gauge: On all models except ST and SV it is necessary to use a level test gauge to set the fuel level properly, because when the float cover is removed the gasoline level drops (not on ST and SV models). Three gauges are required to fit all makes of Zenith carburetors (one each for models L, O, and T) and the price is $2.50 each. (Can be obtained of Zenith-Detroit Corp., Detroit, Mich., or at Zenith service stations.)