Fuel System

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Contents:

Description of Fuel System

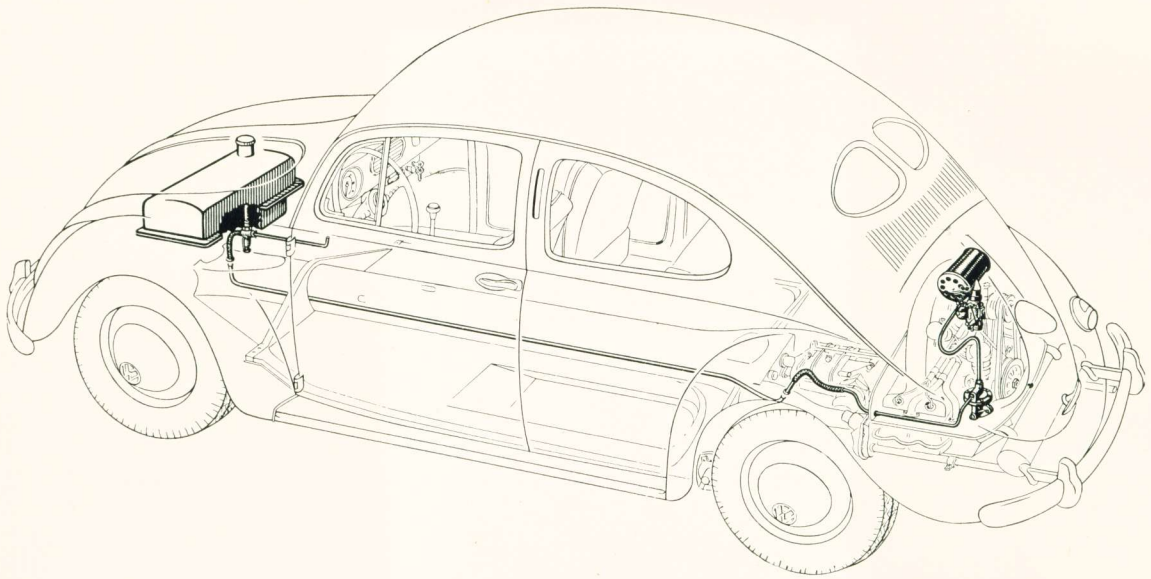
General Description

The fuel system is composed of the fuel tank, fuel filter, fuel lines, mechanical fuel pump, and the downdraft carburetor and air cleaner.

The fuel tank, having a capacity of 40 liters (10.5 U.S. gals.; 8.8 Imp. gals.), is accessible by lifting the front bonnet. The fuel tap, situated underneath the tank, regulates the flow of fuel and can be operated from the front seats. Its three positions are: shut off, open, and reserve. The fuel reserve (5 liters : 1.3 U.S. gal.; 1.1 Imp. gal.) can only flow out after the tap has been turned to the reserve position.

The mechanical pump serves to draw the fuel from the tank through the fuel line in the frame tunnel and then force it on into the carburetor.

The air drawn in by the carburetor goes through a cleaner to prevent dirt, dust and other abrasive particles from entering the engine.



Maintenance and Adjustment

The fuel filter must be cleaned regularly at the prescribed intervals. Special care should be taken when filling the tank from cans to avoid dirt and foreign matter entering the tank. It is recommended to filter the fuel through a clean piece of chamois when filling the tank. As an additional precaution, a fine fuel filter may be installed at the fuel pump.

The air cleaner should be serviced in accordance with the instructions given under a separate heading in this section. Under severe dust conditions, the air cleaner must be serviced more frequently than indicated in the Maintenance Chart, in extreme cases even daily.

The fuel pump requires no service attention. The pump pressure should be checked when fuel consumption is excessive or engine cuts out at high speeds.

The carburetor should be cleaned in accordance with the instructions given on later pages in this section. It should also be checked and adjusted to insure good engine performance under all operating conditions (climate, altitude, etc.). If complaints are made in regard to excessive fuel consumption, no attempt should be made to effect a remedy by changing the jets. The first step to be taken in analysing such complaints is to determine the fuel consumption by means of a fuel-mileage tester. Driving habits or abnormal operating conditions are often responsible for an excessive fuel consumption.

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General Description

The **fuel-air mixture** for the engine is produced in the carburetor. The fuel is atomized and thoroughly mixed with air in the correct proportions to assure good engine performance. The operating principles of the downdraft carburetor promote the cylinder filling by making full use of the increasing speed of the air stream. This advantage greatly contributes to the elasticity and performance of the engine and facilitates the starting procedure.

The carburetor has a **central air supply**. This means that the air required for varying operating conditions and for the float chamber ventilation must pass through the air cleaner on top of the carburetor air horn. Thus the ingress of dirt is reduced to a minimum. The design of the float chamber ventilation insures a constant fuel level, even when the air cleaner is clogged. The fuel consumption will, therefore, not be influenced by the degree of dirt accumulated in the air cleaner.

The **preheating** of the intake manifold not only prevents the condensation of fuel vapor, but assures improved engine performance by vaporizing any unvaporized particles remaining in the fuel gas. Thus the mixture is well kept within the explosive range.

The choke valve in the carburetor air horn serves as a **starting device** for cold starting. It is operated through a pull knob on the instrument panel.

The function of the **idling circuit** may be considered as that of an auxiliary carburetor which produces the fuel-air mixture when the throttle is closed or slightly open.

The diaphragm-type **accelerator pump** is linked to the throttle. It causes the engine to pick up speed quickly and aids in securing maximum performance, flexibility, and economy.

The carburetor consists of the bowl (incorporating float, venturi, throttle valve, accelerator pump, and the jet system) and the bowl cover (incorporating choke valve, float needle valve, and the pump jets).

Operation

Fuel is delivered through a line from the fuel pump to the carburetor where it enters the float bowl and the spraying well through the float needle valve. When the fuel level reaches a certain height, the needle valve is closed by the rising float, shutting off the supply of fuel until the fuel level decreases during operation. The pressure of the float buoyancy against the needle valve is increased by the toggle. The float controls the fuel supply by actuating the needle valve in correspondence with the fuel consumption.

During **normal operation** (high speed, part-load circuit), fuel flows from the float bowl through the main jet into the spraying well and is pulled out through a row of radial outlet holes by the vacuum created in the venturi. The amount of the vacuum depends on venturi size, engine speed, and throttle opening. The restriction (waist) of the venturi surrounding the outlet holes in the spraying well speeds up the air drawn in by the engine. Thus the amount of throttle opening determines the force of the vacuum, permitting varying amounts of fuel-air mixture to be pulled from the spraying well. When the throttle opening increases, the fuel level in the spraying well decreases and air is sucked in through the correction jet. This air passes through the holes in the emulsion tube and mixes with the fuel coming from the main jet. Thus, already a foamy mixture passes out through the holes in the spraying well into the venturi, where it meets the main high velocity air current by which it is atomized. The proportion of air increases with the speed. This insures proper proportions of fuel and air required for varying operation conditions.

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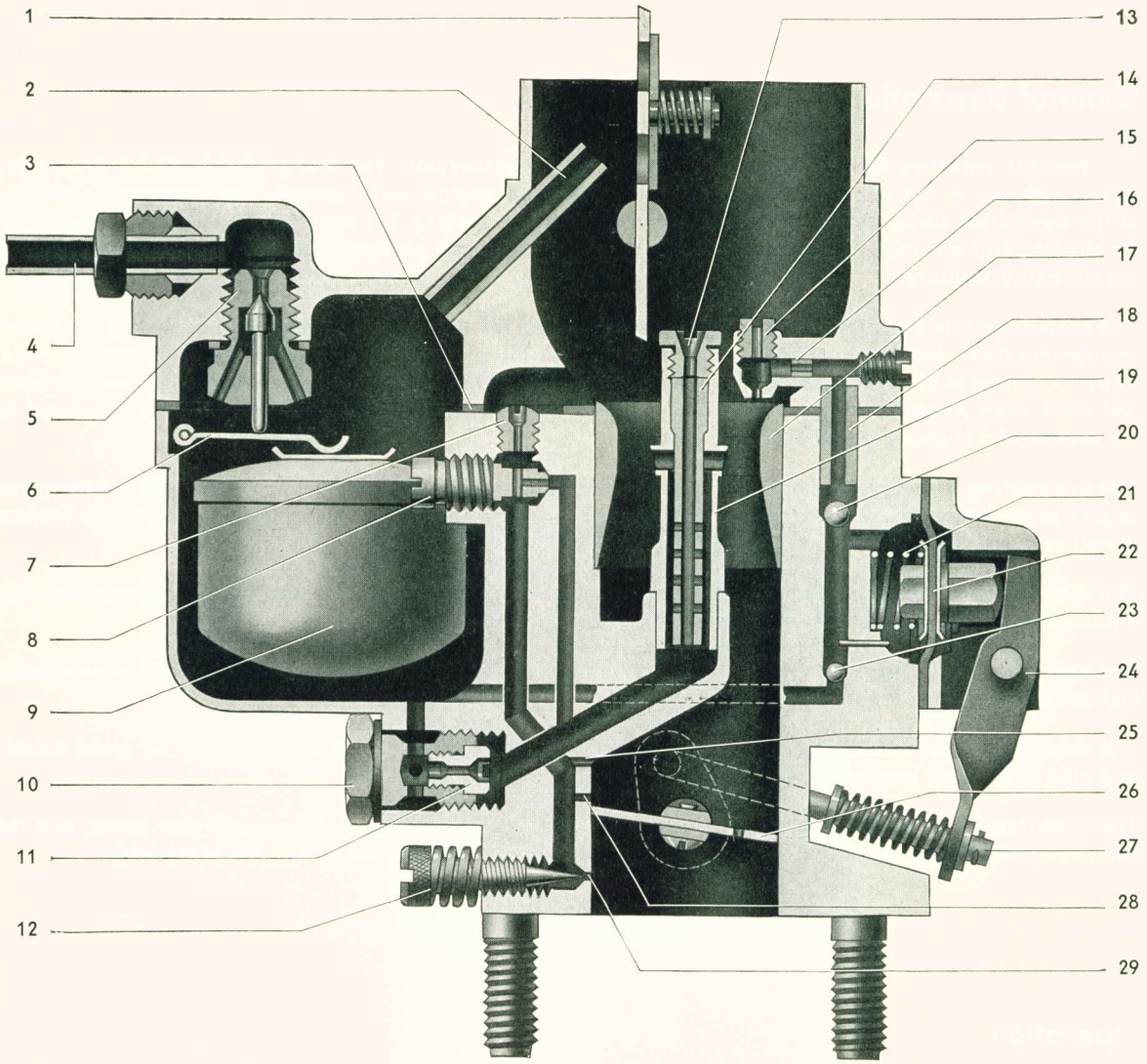


SOLEX 28 PCI

1 - Choke valve
2 - Float bowl vent tube
3 - Gasket
4 - Fuel line
5 - Float needle valve
6 - Float toggle
7 - Pilot jet air bleed
8 - Pilot jet
9 - Float
10 - Main jet carrier
11 - Main jet
12 - Volume control screw
13 - Air correction jet
14 - Emulsion tube
15 - Pump air correction jet
16 - Pump jet
17 - Venturi
18 - Fitting tube
19 - Spraying well
20 - Pump ball check valve, upper
21 - Pump diaphragm spring
22 - Pump diaphragm
23 - Pump ball check valve, lower
24 - Pump connector link
25 - Idle air bleeder passage
26 - Throttle valve
27 - Throttle connector rod and spring
28 - Accelerating port
29 - Idle port

When the throttle is closed, or slightly open, **the idling and low speed circuit** performs the function of furnishing the fuel-air mixture. The air speed is so low and there is such a small volume of air passing through that practically no vacuum develops in the venturi. This means that the spraying well centered in the venturi will not feed any fuel with a closed or slightly open throttle. Therefore, the pilot jet and the pilot jet air bleed produce the mixture at idling speed. This fairly rich mixture is pulled from the idle port by a high vacuum existing on the lower side of the throttle valve. The mixture flows past the tapered point of the volume control screw, mixes with the air escaping around the throttle valve to produce a leaner fuel-air mixture, and passes on into the engine.

The idling mixture is controlled by the volume screw. The idling speed is fixed by the idle adjusting screw.

There are two **accelerating ports** drilled in the wall of the carburetor throat near the throttle valve. When the throttle valve is gradually opened, a nearly constant fuel-air mixture ratio is maintained during the shift from the low-speed to the high-speed circuit. As the edge of the throttle valve swings past the accelerating ports, a sufficient quantity of fuel-air mixture is pulled out by the high velocity air current passing through the space between the edge of the throttle valve and the wall of the carburetor throat.

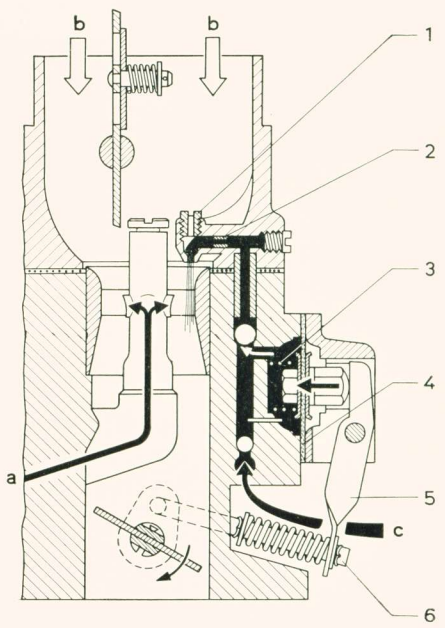
About 10 mm (.4") above the accelerating ports is an idle air bleeder passage which is to lean out the mixture when the throttle valve is suddenly closed. In order to assure a proper function of this bleeder passage, the idling adjustment must be correct.

The accelerator pump is linked to the throttle. When the throttle is closed, the spring-loaded diaphragm returns to its original position and the pump chamber in front of the diaphragm is filled with fuel sucked in from the float bowl. When the throttle valve is opened, the movement is transmitted to the diaphragm through the linkage, forcing the fuel up the passage and out through the discharge nozzle into the mixing chamber. The upper ball check valve is lifted by the fluid pressure while the lower ball check valve prevents the fuel from escaping back into the float bowl. This delivery of additional fuel as the throttle is opened momentarily enriches the mixture and causes the engine to pick up speed quickly. The accelerator pump jet in the discharge nozzle meters the flow of fuel discharged into the mixing chamber. The accelerator pump enriches the mixture only in the low and intermediate speed range, as the spring on the throttle connector rod takes up any further movements of the throttle when the diaphragm has reached its foremost position. The pump chamber is refilled with fuel not before the throttle nearly closes.

Operation of Accelerator Pump

a - Fuel from the main jet
b - Primary air
c - Fuel from float bowl

1 - Pump discharge nozzle and air correction jet
2 - Pump jet
3 - Diaphragm spring
4 - Diaphragm
5 - Pump connector link
6 - Throttle connector rod and spring



The high-speed, full power-circuit. When the throttle is wide open, the accelerator pump passage ad mits an added flow of fuel to discharge through the pump discharge nozzle. This extra fuel is drawn into the mixing chamber by the suction on the discharge nozzle. At part throttle positions the mixture is only slightly enriched, as the suction is then controlled by the air correction jet in the discharge nozzle. The suction increases with the amount of throttle opening, so that a progressive supply of extra fuel is given to secure added engine performance.

Adjustment

The carburetor is tested at the factory and adjusted to produce the best consumption-to-performance ratio. Any change in its setting by replacing the jets or the venturi by other than the prescribed sizes should be avoided. In general, excessive fuel consumption is not due to any malfunctioning of the carburetor. With the idling mixture being overrich, the engine tends to stall when suddenly braking and the consumption will be excessively high in the speed range up to 60 km/h (40 m.p.h.). A properly adjusted idling speed is the first requirement for a perfect functioning of the carburetor. The idling adjustment should be carried out with the engine having obtained operating temperature.

Cleaning the Carburetor

To clean the carburetor, remove the bowl cover.

Removal

1 - Remove air cleaner.

2 - Disconnect fuel line between carburetor and fuel pump.

3 - Remove the screws that attach the cover to the carburetor bowl.

4 - Lift the bowl cover.

5 - Swing the bowl cover backward. For the complete removal of the bowl cover, the choke control cable and the throttle connector link must be disconnected.

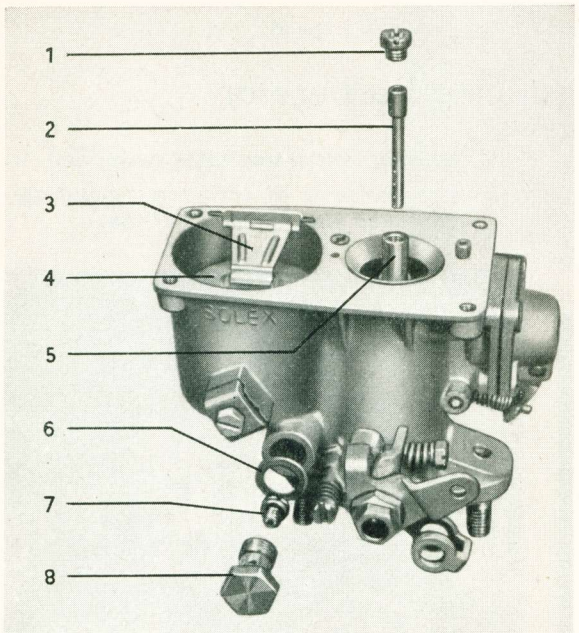
Cleaning

1 - Remove float toggle lever.

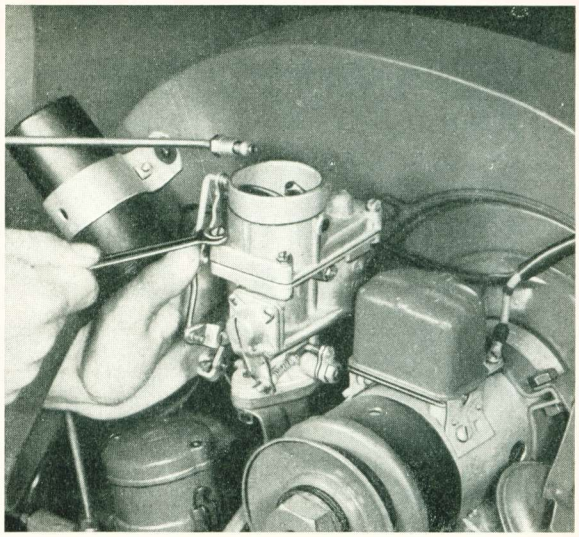
2 - Remove float.

3 - Remove main jet carrier and clean float bowl and main jet.

4 - Remove and clean air correction jet and emulsion tube (The spraying well is not removable).

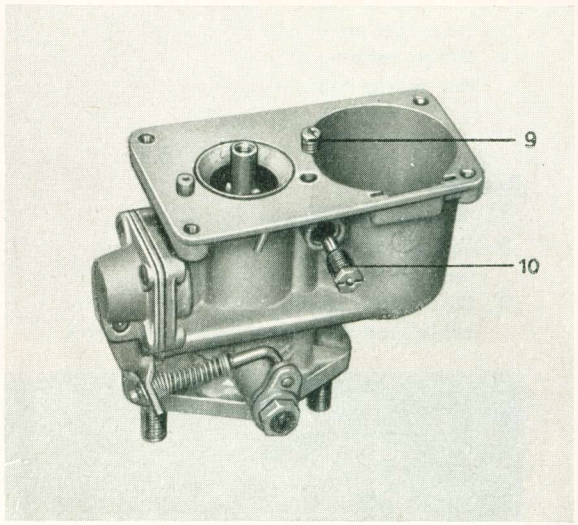


1 - Air correction jet
2 - Emulsion tube
3 - Float toggle lever
4 - Float
5 - Spraying well
6 - Gasket
7 - Main jet
8 - Main jet carrier



5 - Remove and clean pilot jet.

6 - Remove and clean pilot jet air bleed.



9 - Pilot jet air bleed
10 - Pilot jet

7 - Remove and clean float needle valve.

8 - Clean pump discharge nozzle.

Blow out the jets and passages with compressed air. Never use a pin or a piece of wire, as this will damage the jets.

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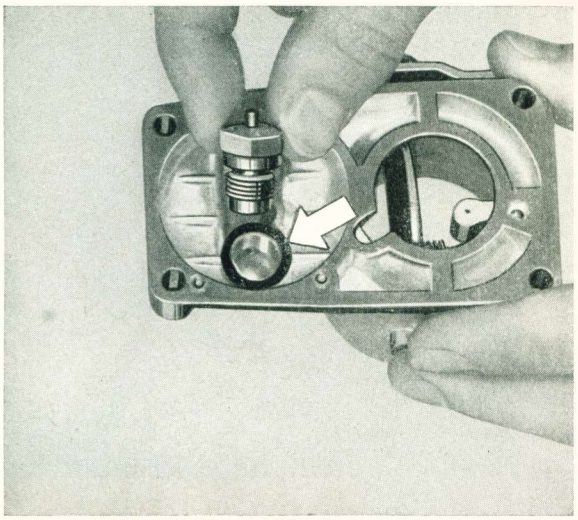
Installation

To reinstall the unit, proceed in reverse order, while observing the following points:

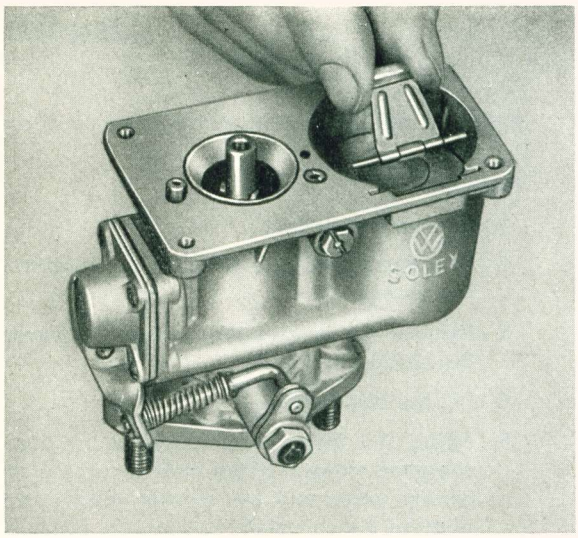
1 - Note proper position of float needle valve gasket.



2 - Be sure the gasket between bowl and bowl cover is in good condition and properly positioned.

3 - The word "oben" on the float toggle lever must face upwards.

4 - When refitting the bowl cover, tate care that the fitting tube projecting from the jointing face of the carburetor bowl fits snugly into the bowl cover.



5 - Connect choke control cable, taking care that the choke valve is fully open with the operating knob pushed in.

6 - Oil choke valve shaft, throttle valve shaft and control linkage.

7 - Do not overtighten air cleaner clamp screw to avoid distortion of the air horn, as this would cause the choke valve to stick.

8 - Adjust idle speed.

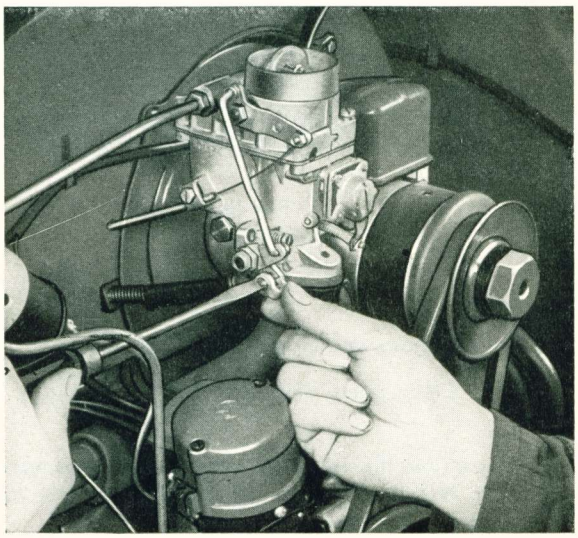
Removing and Installing Carburetor

Removal

1 - Remove air cleaner.

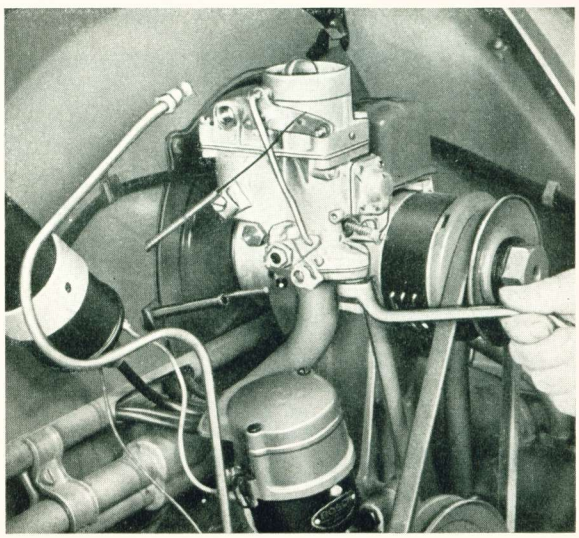
2 - Disconnect fuel line between carburetor and fuel pump.

3 - Disconnect accelerator cable, choke control cable, and choke control cable sleeve.



4 - Remove accelerator cable swivel pin.

5 - Unscrew nuts of carburetor mounting studs (Cranked Ring Spanner VW 158).



6 - Take off carburetor.

Installation

Installation is a reversal of the preceding operations, but the following points should be noted:

1 - Replace gasket at intake manifold flange.

2 - To connect accelerator cable to throttle lever proceed as follows: Open throttle valve so that there is a clearance of about 1 mm (.04") between throttle lever and stop at carburetor body. Fully depress accelerator pedal and connect cable to throttle lever.

3 - Connect choke control cable, taking care that the choke valve is fully open with the operating knob pushed in.

4 - Do not overtighten clamp screw of air cleaner.

5 - Adjust idle speed.

Disassembly and Assembly of Carburetor

Disassembly

1 - Remove carburetor.

2 - Remove the screws that attach the cover to the carburetor bowl and lift off the cover.

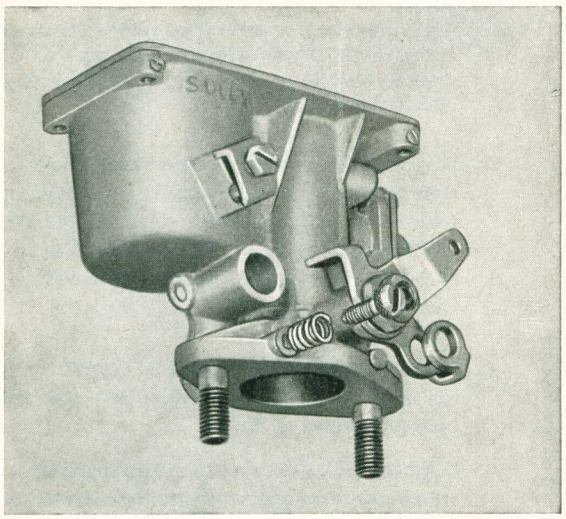
3 - Screw out float needle valve.

4 - Remove float toggle lever and take off the float.

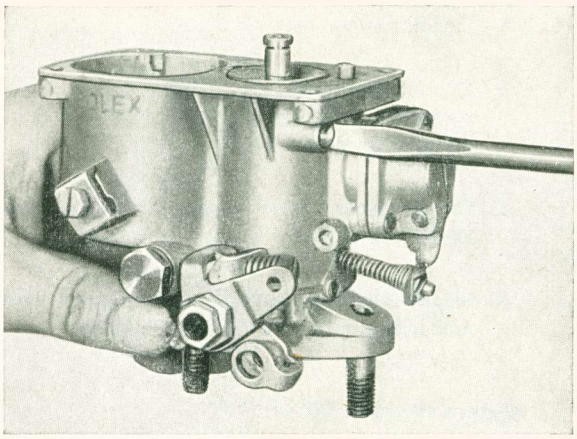
5 - Remove air correction jet and emulsion tube.

6 - Remove main jet, pilot jet, and pilot jet air bleed.

7 - Remove volume control screw and spring.

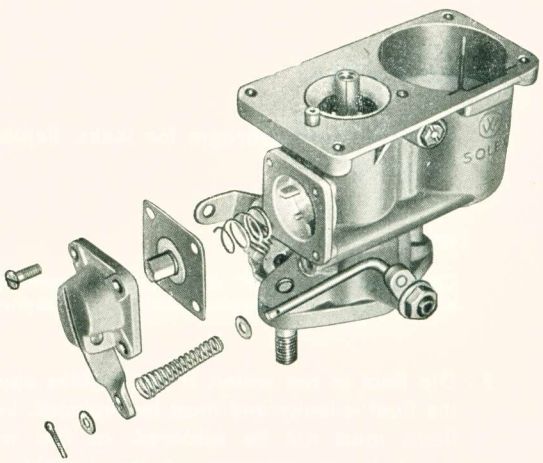


8 - Release venturi retaining screw and lift out venturi.



9 - Remove cotter pin from throttle connector rod.

10 - Remove pump cover retaining screws. Take off cover, diaphragm, and spring.



11 - Screw out discharge nozzle plug screw.

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Cleaning

1 - Clean all carburetor components in fuel.

2 - Blow out the jets, valves and passages with compressed air. Never use a pin or a piece of wire, as this will damage the jets.

Inspection and Assembly

Assembly is a reversal of the disassembly procedure. To check the components, proceed as follows:

Bowl Cover

1 - Check needle valve for leaks.

2 - Examine needle valve gasket for correct condition and see to it that it is properly installed to prevent leaks.

3 - Check choke valve spring and clearance of choke valve shaft.

4 - Inspect choke poppet valve for perfect sealing and make sure that it easily opens.

Note: Carburetor SOLEX 28 PCI

From Chassis No. 1 306 289 the tension of the choke poppet valve spring has been increased from 33 grams (1.16 oz.) to 48+7 grams (1.69+.25 oz.) at a loaded length of 8 mm (.314"), the free length being about 21 mm (.827").

The stronger spring can be installed on all earlier carburetors 28 PCI.

The objekt of these modifications is to facilitate starting the engine in severe frost.

Carburetor Bowl

1 - Check pump diaphragm for leaks. Replace if necessary.

Note:

Carburetor "flat spot" when suddenly opening the throttle generally indicates a leaky pump diaphragm.

2 - Dip float in hot water. If air bubbles appear, the float is leaky and must be replaced. Leaky floats must not be soldered, as this would result in an increase of the weight. (See "Specification Data" for correct weight of float.)

Note:

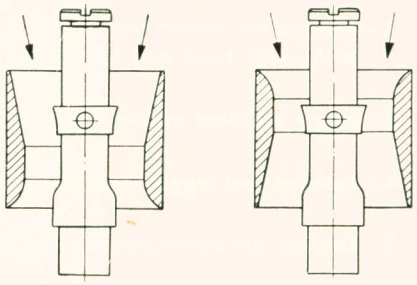
From Engine No. 1 - 0 814 685 the carburetor 28 PCI is equipped with a nylon float (weight 5.7 grams).

Brass and nylon floats are interchangeable. Brass floats still in stock should be used up.

3 - Check all jets for the correct sizes given in the chart "Specification Data".

When replacing jets or valves, only genuine SOLEX parts should be used. Only these parts assure a perfect functioning of the carburetor under all conditions of operation. Only use main jets and main jet carriers provided with ring grooves.

4 - Install venturi. Be sure that the restriction of the inner diameter (waist) of the venturi is at the top.



Wrong! **Correct!**

Do not overtighten retaining screw in order not to distort venturi.

Note:

The carburetor is now fitted with a plastic venturi instead of the previous light metal type.

Venturies of the earlier and of the new type are interchangeable.

5 - Check clearance of throttle valve shaft. Excessive clearance causes ingress of secondary air which has a detrimental effect on the starting and idling operation of the engine. If necessary, fit bushes to throttle valve shaft to take up the clearance.

6 - Inspect tip of volume control screw. Renew if tip is bent or broken off. Only use volume control screws of brass.

Inspect tapped hole and seat for volume control screw for damage; remove tip of old control screw, if it has broken off.

7 - The word "oben" on the float toggle lever must face upwards.

Carburetor Adjustment

The jet settings have been determined by the manufacturer after considerable research to assure the best consumption-to-performance ratio. Any change in the settings by replacing the jets or the venturi by other than the prescribed sizes should be avoided. When changing from one brand o fuel to another, say from gasoline to a gasoline/benzol mixture, the carburetor requires in general only a readjustment of the idling speed.

Specification Data

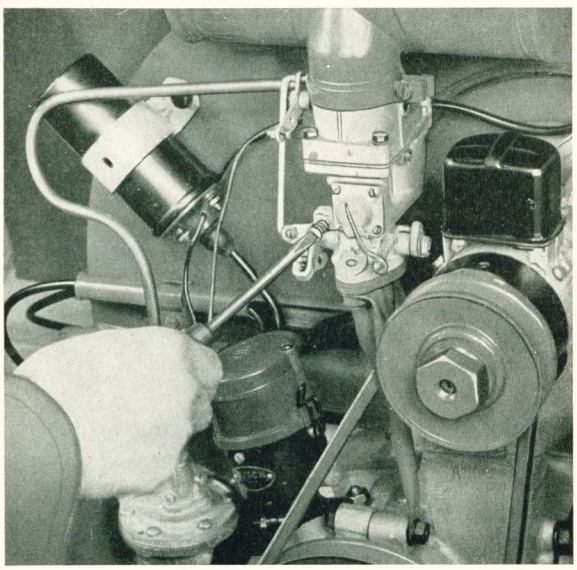
	1131 c.c. engine	1192 c.c. engine
Venturi	20 mm diam.	21.5 mm diam.
Main Jet	105	122.5
Pilot Jet	50	50
Pilot Jet Air Bleed	0.8 mm diam.	0.8 mm diam.
Air Correction Jet	190	200
Pump Jet	50	50
Pump Air Correction Jet	2.0	2.0
Emulsion Tube	10	29
Needle Valve	1.5	1.5
Float Weight	12.5 g	12.5 g
Pump Feed	.40—.55 c.c. per stroke	.40—.55 c.c. per stroke

Idling Adjustment

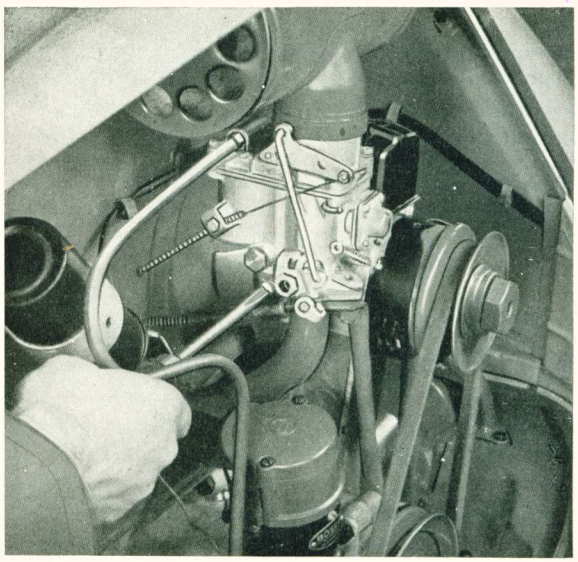
An idling adjustment will be necessary from time to time. **Before attempting to adjust the carburetor, make sure the engine is at normal operating temperature.**

Idling adjustment should in all events be carried out as follows:

1 - Turn the idling adjusting screw in or out until an idling speed of approximately 550 r.p.m. has been attained.



2 - Turn the volume control screw clockwise until the engine speed begins to drop, then give it a quarter turn in anti-clockwise direction. Then, if necessary, adjust a little in either direction until the engine idles smoothly.



3 - Re-adjust the idling adjusting screw until the engine runs at normal idling speed.

Normal idling speed is usually attained at $1^1/_4$ to $1^1/_2$ turns of the volume control screw, starting from the fully closed position.

However, do not attempt to close the screw completely as any improper handling will tend to damage the conical tip or the idle port.

Accurate idling adjustment is of the greatest importance as it has an essential bearing on fuel consumption in the lower and medium speed ranges. Under really unfavorable conditions, the increase in consumption may even reach $^1/_2$ liter for each hundred kilometers (1 Imp. gall. for each 560 miles, or 1 U.S. gall. for each 470 miles). It

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will be especially pronounced in the case of vehicles operating under unfavorable conditions most of the time.

Check by speeding up the engine momentarily and releasing the accelerator pedal quickly. If the engine stalls, the mixture should be enriched a trifle by backing out the volume control screw (approx. $^1/_{16}$ turn) until sudden releasing of the pedal after acceleration does not cause stalling. If no remedy is effected, it may be due to a worn carbon thrust ring of the release bearing. During operation a stalling of the engine when the throttle is suddenly shut or when applying the brakes may also be caused by too rich a mixture. Poor idling may be the result of damaged gaskets, or intake manifold flanges not sufficiently tightened, or fuel pump being mal-adjusted.

Faults in the ignition system or an undue departure from the correct compression in the individual cylinders may also have a detrimental effect on the idling.

Air Cleaner

General

The purpose of the air cleaner is to filter all dust and grit from the air drawn through the carburetor intake, thus eliminating one of the contributory causes of cylinder and piston wear. The air cleaner must be serviced at the intervals indicated in the Maintenance Chart, or more frequently under severe dust conditions.

If the car is mainly operating under desert or other extreme conditions of dust-laden atmosphere, the air cleaner should be serviced more frequently than prescribed on the Maintenance Chart. The air cleaner must at any rate be cleaned if there is no longer thin oil above the sludge accumulated on the bottom of the oil reservoir.

1 - Filter element
2 - Gasket
3 - Oil reservoir

Felt Cone Type Air Cleaner

This filter cannot be dismantled. Rinse the air cleaner in fuel or another volatile cleaner. The fuel is to be poured into the intake hole of the filter. The cleaner should be blown dry before replacing it in order to avoid starting trouble.

Oil Bath Air Cleaner

should be serviced every 5000 km (3000 miles). Detach cleaner from carburetor, unfasten retaining strap and disassemble the cleaner. Remove dirty oil from reservoir and refill with fresh engine oil SAE 20 up to the mark (approx. 0.25 liter/0.5 pint). The filter element should be rinsed in fuel, kerosene, or any other degreasing solution.

The oil level in the fluid reservoir should be checked every 2500 km (1500 miles). When topping up, take care that the oil level is not above the mark.

Note:

The shape of the oil bath air cleaner has been altered.

While the outer diameter has been decreased, the total height has been increased.

The designation for the new cleaner is:

Oil Bath Air Cleaner Part No. 111 129 611 D } (as
Oil Bath Air Cleaner Part No. 111 129 611 E } desired)

Service installation of the new oil bath air cleaner in vehicles of previous design is possible. The previous oil bath air cleaner may, however, not be installed in vehicles of later version.

The oil level must not be above the mark pressed in the lower part.

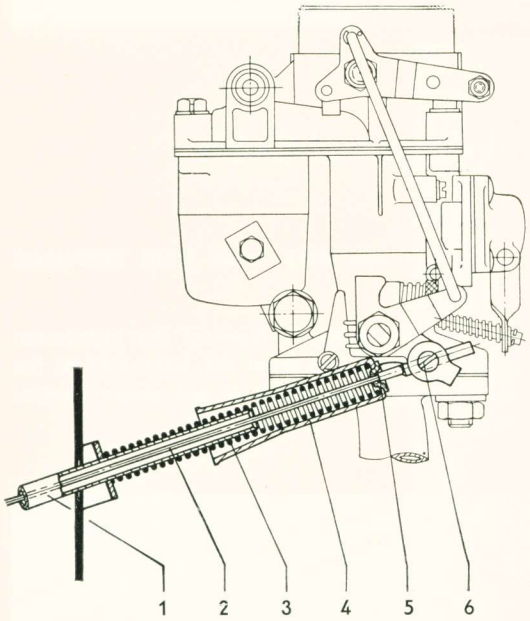
This alteration was necessary because of the new shape of the engine compartment hood.

Removing and Installing Accelerator Cable

General

The accelerator cable passes through the frame tunnel and fan housing of the engine in conduit tubes. It is attached to a bolt in the accelerator pedal at one end and to a swivel pin in the throttle valve lever at the other.

The spring pushed over the conduit tube at the fan housing effects a return of the accelerator cable and closes the choke. A guide sleeve prevents the spring from becoming deflected.



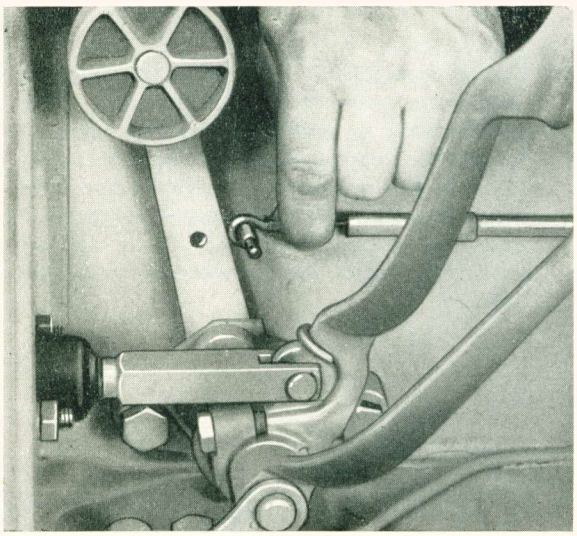
1 - Accelerator cable conduit tube
2 - Accelerator cable
3 - Accelerator cable spring
4 - Spring guide sleeve
5 - Spring seat
6 - Accelerator cable swivel pin

Removal

The removal and installation is facilitated by lifting the rear end of the vehicle.

1 - Disconnected accelerator cable from throttle valve lever.

2 - Compress the spring and remove spring seat. Take off guide sleeve and spring.

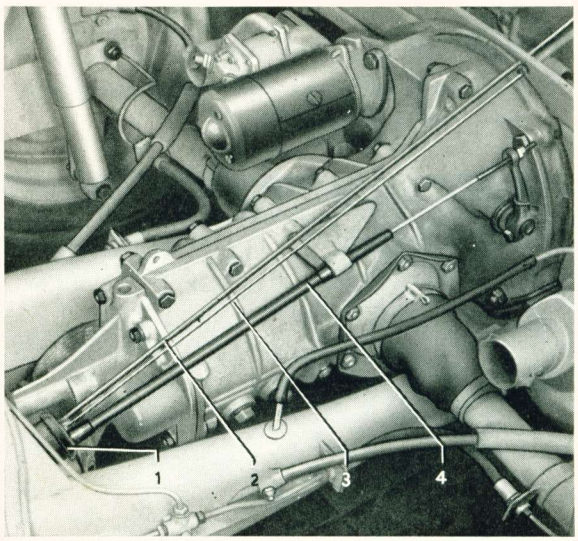


3 - Detach bolt from accelerator pedal and disconnect cable from bolt.
4 - Pull out accelerator cable from its conduit tube in the fan housing towards the front.
5 - Take off rubber boot at the end of the cable conduit tubes in the frame.
6 - Completely pull out accelerator cable towards the front.

Installation

This is a reversal of the preceding operations, but the following points should be noted:

1 - Grease accelerator cable with Universal Grease VW - A 052.
2 - Take care that the cables do not intertwine at the rear.



1 - Rubber boot
2 - Choke control cable
3 - Accelerator cable
4 - Clutch cable

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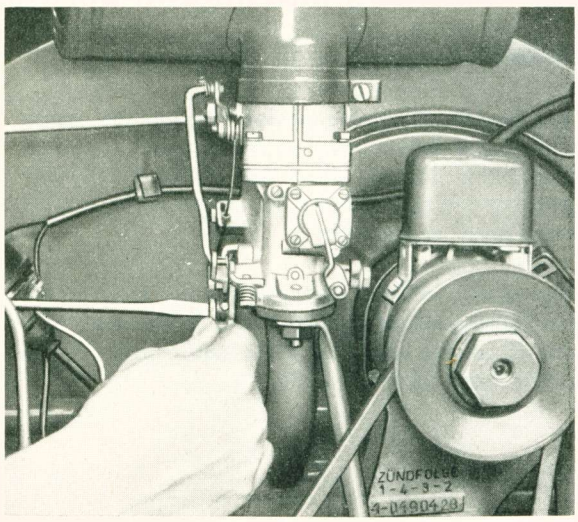
3 - See that the rubber boot is correctly seated to avoid water entering the conduit tubes.

4 - Special care must be taken when attaching the accelerator cable to the throttle valve lever, as otherwise an undue tension may occur at full throttle, leading to a breakage of the cable. Open throttle valve so that there is a clearance of about 1 mm (.04") between throttle lever and stop at carburetor body. Fully depress accelerator pedal and connect cable to throttle valve.



Removing and Installing Choke Control Cable

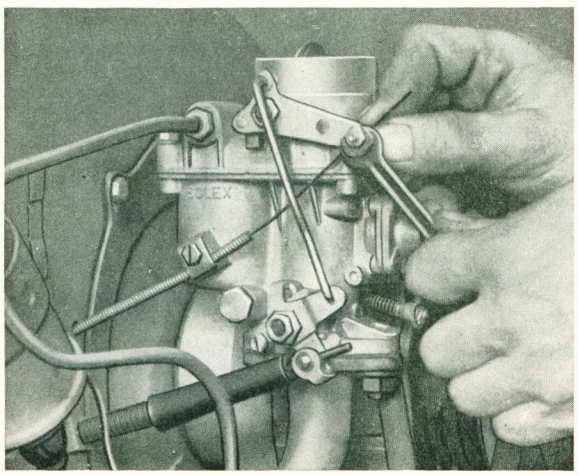
General

The choke control cable runs through a flexible metal sleeve which in turn is provided with a plastic coating. It passes from the instrument panel through the front luggage compartment and cross scuttle to the conduit tube in the frame tunnel, from where it passes to the carburetor through the fan housing. The cable is attached to the choke lever by means of a clamp screw. The choke valve is operated by pulling the knob situated next to the ignition switch.

Removal

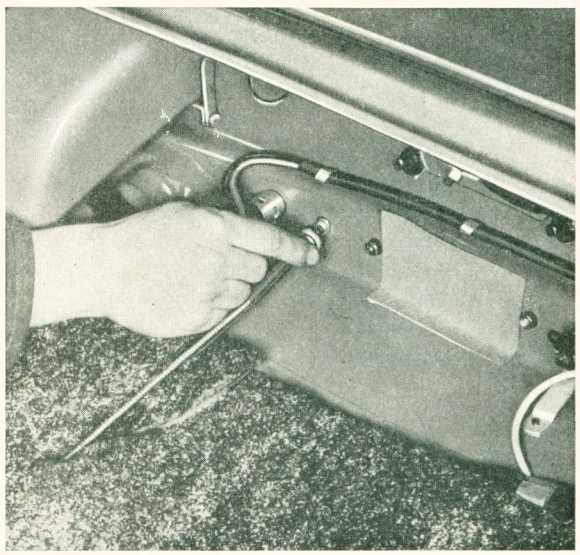
1 - Lift the car.

2 - Disconnect cable from choke lever and detach cable sleeve from carburetor.

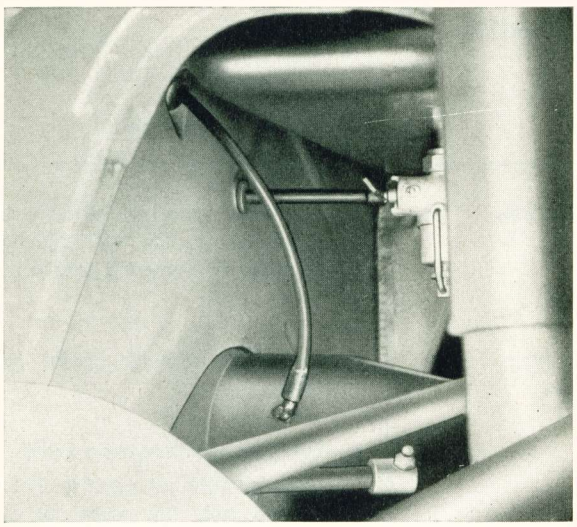


3 - Screw off operating knob from instrument panel.

4 - Remove the lining in front of the instrument panel. Remove nut from the back side of the instrument panel and pull out choke control cable.



5 - Remove right-hand front wheel. Detach choke control cable rubber sleeve from conduit tube protruding from the frame tunnel and pull out cable and flexible metal sleeve.



Installation

Installation is accomplished by reversing the removal procedure, but the following points should be observed:

1 - Take off rubber boot at the rear end of the conduit tubes in frame tunnel and fill it with Universal Grease VW - A 052.

2 - Blow out conduit tube in frame tunnel with compressed air and fill it with Universal Grease VW - A 052.

3 - Grease choke control cable with Universal Grease VW - A 052 and insert it into the flexible metal sleeve.

4 - Push cable and sleeve from front luggage compartment through the cross scuttle into the frame tunnel conduit tube. To avoid ingress of water, make sure that the rubber grommet in the cross scuttle, the rubber sleeve on the conduit tube front end, and the boot at the conduit tube end are correctly positioned.

5 - Take care that the choke cable does not intertwine with the clutch or accelerator cable.

6 - Attach choke control cable to the instrument panel and screw the knob in position.

7 - Attach choke control cable to choke lever taking care that the choke valve is fully open with the operating knob pushed in.

Operation of Choke Valve

It is a known fact that the choke valve is to be operated i. e. the choke control knob is to be pulled out when starting a cold engine at low outside temperature.

As soon as the engine has started, push the choke control knob slowly in until the engine runs smoothly and evenly at idling speed without stalling even when declutching. How far the knob should be pushed in is a matter of experience but in any case it has to be pushed in farther at mild temperature than at severe cold.

The choke control knob is to be pushed in completely only after a certain distance has been driven. The required length of this distance depends on the outside air temperature and on the way of driving. The linkage between choke valve and throttle valve causes the throttle to open a little when the choke valve closes. As a result, the idling speed of the engine can be regulated over a wide range so that the engine can be prevented from stalling on account of low operating temperature.

Quite frequently, the choke control knob is pushed in all the way immediately after starting and the driver may then be surprised to notice that the engine stalls at the next stop. And now, the wrong kind of counter-measure is usually taken against this sort of stalling: idling speed is increased by means of the idle adjusting screw and the idling mixture is enriched by means of the volume control screw. Apart from the fact that the engine, when warming up, will then run at too fast an idling speed with too rich a mixture, the fuel consumption may be increased by 1/2 liter per 100 km (almost a quart for every 60 miles). Furthermore, with this kind of adjustment, the engine will occasionally tend to develop combustion knock.

It is not always the customer who, for lack of knowledge and experience, changes the idling adjustment arbitrarily. May we, therefore, suggest that the workshop personnel be thoroughly instructed about the proper idling adjustment and about how to operate the choke control knob correctly.

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Carburetor Trouble Checking

Symptoms	Cause	Remedy
1 - Engine will not start (with fuel in tank, ignition in order, and choke closed)	a - Choke does not fully close	a - Eliminate jamming, replace choke if necessary. Do not overtighten air cleaner clamping screw
	b - Choke poppet valve sticks or does not fully close	b - Repair or replace choke poppet valve
	c - No fuel in svstem	c - Check in the following order: Release main jet carrier. If fuel is coming out, the main jet is obstructed. If no fuel is coming out, disconnect pipe to fuel pump and set starter in motion with the spark plug leads disconnected. If there is a well-defined spurt of fuel at every working stroke of the pump, the float needle valve is clogged up. If no fuel is ejected , it may be due to: pump valves sticking, pump mechanism at fault, dirt in fuel tap
2 - Flat spot at idling speed	a - Pilot jet blocked up	a - Clean pilot jet
	b - Induction air leakage at flange. Cracks in induction manifold	b - Tighten induction manifold flanges, replace gasket if necessary. Check induction manifold for air leakage. Weld or renew cracked induction manifolds
	c - Volume control screw damaged (tip broken off)	c - Replace volume control screw (remove tip, if broken off)
	d - Idling mixture too lean	d - Properly adjust idle mixture and idle speed so that engine runs evenly and steadily
3 - Poor acceleration	a - Idling mixture too lean	a - Properly adjust idle mixture and idle speed so that engine runs evenly and steadily
	b - Accelerator pump diaphragm leaky	b - Check and, if necessary, replace diaphragm

Symptoms	Cause	Remedy
4 - Engine stalls when suddenly releasing accelerator pedal	Idle mixture too rich	Check and correct idle adjustment
5 - Engine runs uneven at low idle speed and exhaust soots excessively at high idle speed. Spark plugs tend to soot up and fail to produce sparks	a - Excess pressure on float needle valve b - Float leaky c - Float needle valve does not close	a - Check pump pressure, reduce if necessary b - Replace float c - Clean or replace float needle valve
6 - Engine runs uneven, misfires, and cuts out at full throttle	Fuel starvation	a - Clean main jet b - Clean float needle valve c - Check pump pressure, increase if necessary d - Clean fuel tap
7 - Excess fuel consumption	a - Jet sizes not properly adapted to one another b - Excess pressure on float needle valve c - Float leaky d - Float needle valve does not close	a - Install correct set of jets. Check "face" of spark plugs b - Check pump pressure, reduce if necessary c - Replace float d - Check float needle valve and replace if necessary

Note. Poor acceleration and a tendency of the engine to stall when idling may also be due to an insufficiently advanced ignition, too low a breaker point gap, or dirty spark plugs. Always check ignition system when in doubt.

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Fuel Pump

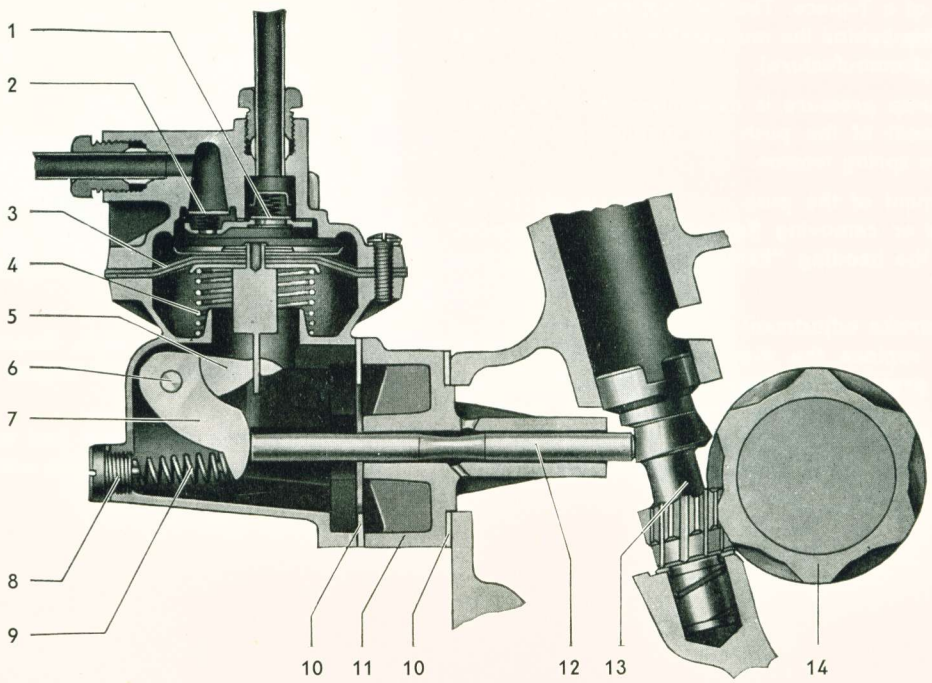
General Description

Fuel is fed to the carburetor by a SOLEX-diaphragm pump which is attached to the crankcase. It is operated mechanically from an eccentric on the distributor drive shaft. The flow of fuel delivered by the pump is automatically regulated as the fuel is used up from the float bowl.

The fuel pump consists of the cover, containing suction valve and delivery valve, and the pump body, incorporating the rocker mechanism. The diaphragm and spring are situated between the cover and the body. The diaphragm consists of several layers of special flexible, clothlike material that is not affected by the fuel and two protectors which are riveted to the diaphragm pull rod.

Operation

As the distributor drive shaft revolves, the eccentric causes the push rod to move against the rocker arm which pulls the diaphragm downward against the diaphragm spring. This movement creates a vacuum above the diaphragm which lifts the suction valve off its seat so that fuel can be drawn in. When the push rod moves backwards, the loaded diaphragm spring pushes the diaphragm upward, forcing the fuel in the pump through the delivery valve and into the carburetor. This process is repeated at every turn of the eccentric (once every two revolutions of the engine).



SOLEX Fuel Pump Sectional View

1 - Delivery valve
2 - Suction valve
3 - Diaphragm
4 - Diaphragm spring
5 - Rocker arm link
6 - Rocker arm pin
7 - Rocker arm
8 - Spring retaining plug and gasket
9 - Rocker arm spring
10 - Gasket
11 - Intermediate flange
12 - Push rod
13 - Distributor drive shaft
14 - Distributor drive gear

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The pump pressure depends on how much the spring is compressed during the pump suction stroke. This pressure is balanced by the buoyancy of the carburetor float, which causes a corresponding pressure at the needle valve seat. As fuel rises in the float bowl, the needle is forced up with greater pressure. Thus the pressure in the fuel line and pump chamber increases, while the pump working stroke decreases. With normal engine operation, the diaphragm is moved only some tenth of a millimeter.

A hole is provided for bleeding the chamber below the diaphragm. This hole also permits the draining of fuel which might have entered the lower chamber.

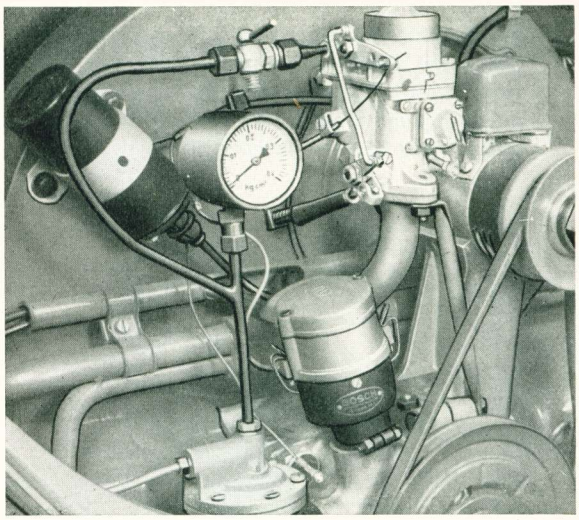
Checking Pump Pressure

The pump pressure should amount to 0.09—0.13 atm. (1.30—1.85 lbs./sq. in.) with the needle valve closed and the engine running at 1000—3000 r.p.m. The minimum amount of fuel delivery is 167 cu. cm per minute (10.2 cu. ins.). To check the fuel pump pressure, connect a manometer (range: 0—0.4 atm. = 0—5.7 lbs./sq. in.) which is brazed to a fuel test line between the pump and the carburetor by means of a T-piece. The fuel test line is fitted with a fuel tap behind the manometer (drawing VW 364 for local manufacture).

The pump pressure is determined by the correct adjustment of the push rod stroke and the diaphragm spring tension.

Adjustment of the push rod stroke is effected by adding or removing flange gaskets as described under the heading "Removing and Installing Fuel Pump".

If the stroke adjustment does not give the desired result, replace the diaphragm spring. With the pump pressure too high, the intermediate turns of the spring may be brought further together, and with the pump pressure too low they may be stretched apart, if the necessity should arise.



If the pressure is too high, flooding and, consequently, a dilution of the engine oil will be the result.

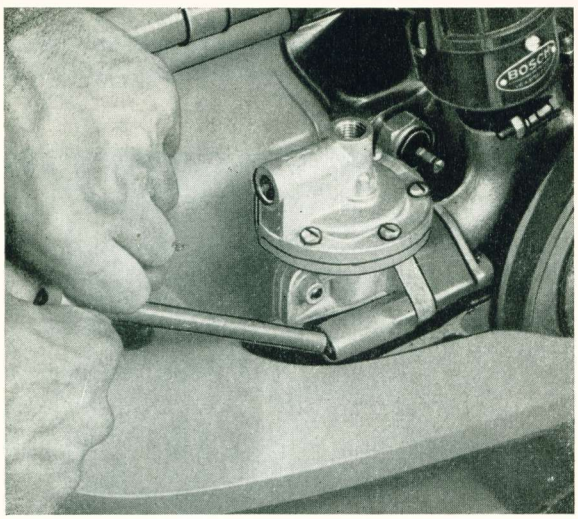
If it is too low, insufficient fuel will be delivered and faulty engine performance will result.

Removing and Installing Fuel Pump

Removal

1 - Disconnect fuel lines from pump.

2 - Remove the two nuts from the mounting studs at the flange (Spanner VW 126a).



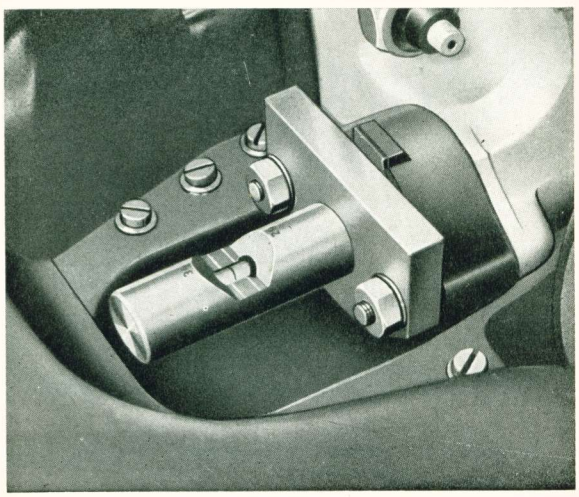
3 - Take off pump.

4 - Remove push rod, intermediate flange and gasket.

Adjusting Stroke of Fuel Pump

1 - Place intermediate flange, push rod and two gaskets, which should be in perfect condition, on fuel pump mounting studs. The oil passage in the intermediate flange must face upwards. The convex end of the push rod must be at the eccentric of the distributor drive pinion.

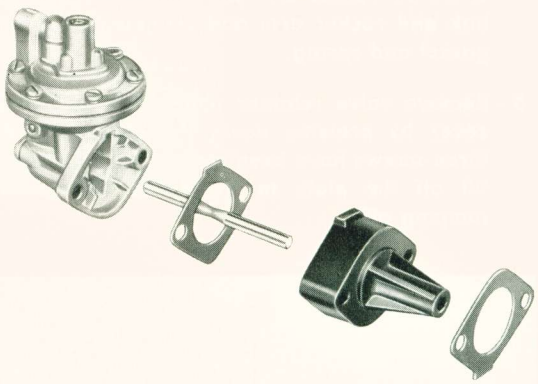
2 - Attach Gauge VW 328a to the flange and tighten it to the same torque as for the fuel pump in order to compress the gaskets to their usual thickness.



The push rod stroke of about 4 mm (.16") is determined by the eccentric on the distributor drive shaft. The stroke should move within a range of 5 mm (.2") which is marked on the gauge. The marks correspond to a length of 29 mm (1.14") and 34 mm (1.34") measured from the fuel pump contact flange (incl. gaskets) to the projecting push rod end. Rotate the engine to check the pump stroke. The stroke can be adjusted by fitting an appropriate number of gaskets to the intermediate flange. Do not fit less gaskets than required, as this would have a detrimental effect on the diaphragm and the drive mechanism.

Installation

1 - Fill lower pump chamber with Universal Grease VW - A 052 before installation.



2 - Install fuel pump. Re-tighten nuts with engine having attained working temperature, but do not overtighten.

3 - Connect fuel lines to fuel pump.

See that the fuel line rubber grommet is correctly seated in the engine front cover plate.

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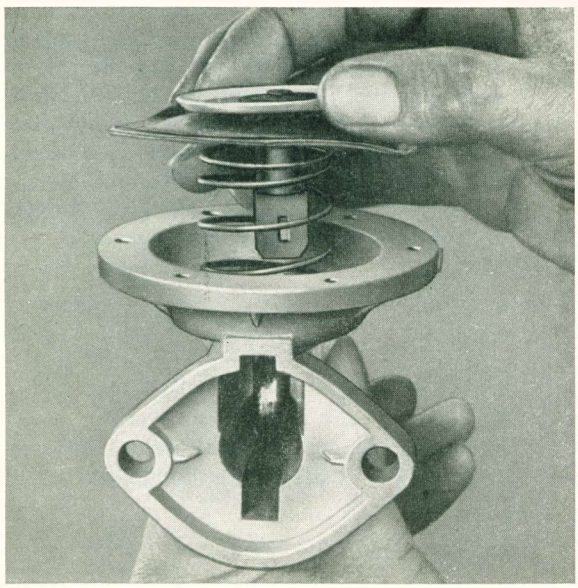
Reconditioning Fuel Pump

Disassembly

1 - Remove fuel pump.

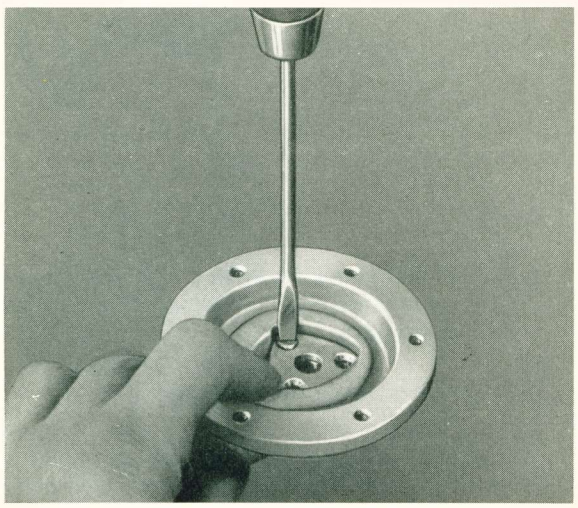
2 - Unscrew the six slotted screws and remove pump cover.

3 - Press down diaphragm and disconnect it from rocker arm link.



4 - Drive out rocker arm pin. Remove rocker arm link and rocker arm and retaining plug with gasket and spring.

5 - Remove valve retainer plate from fuel pump cover by pressing down the plate until the three screws have been screwed out. Carefully lift off the plate to avoid the components jumping off.

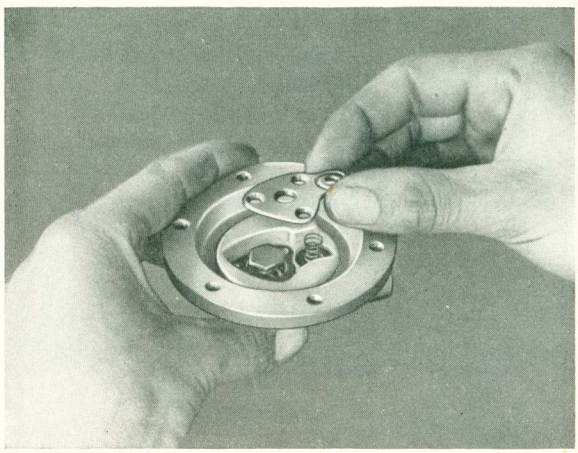


6 - Thoroughly clean all parts in fuel.

Assembly

1 - Inspect valve seats in pump cover and at valve retainer plate. Replace worn parts.

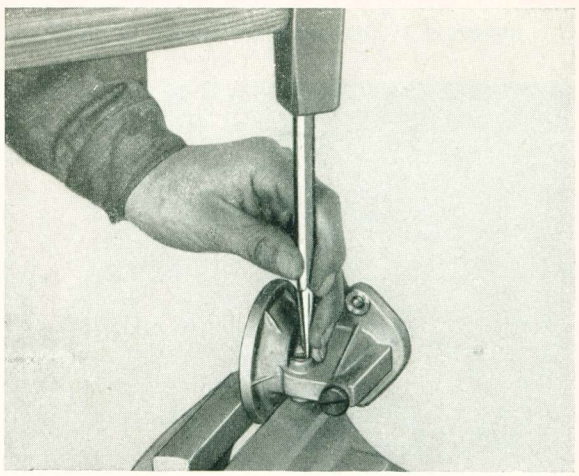
2 - Renew valves, valve springs and valve retainer plate gasket. Place valves in position, taking care that their lapped side makes contact with the valve seat.



3 - Place valve retainer plate in position and press it down until the three screws are evenly tightened.

4 - When the valves are installed, make certain that they open and seal properly.

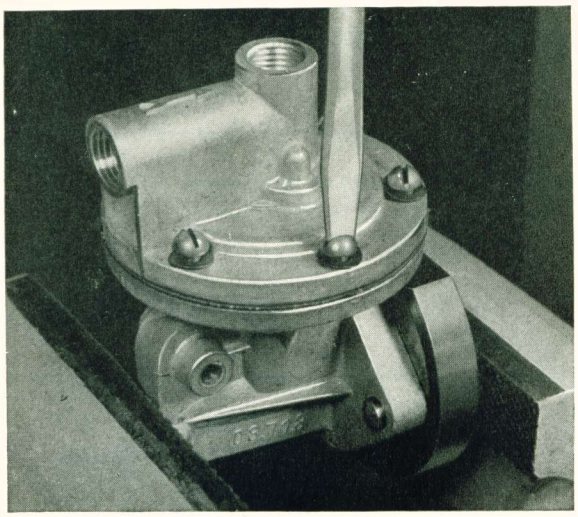
5 - Assemble rocker arm and link in the pump body. Check rocker arm pin for wear. Install pin and secure it in position by means of a chisel.



6 - Assemble rocker arm spring, retaining plug and gasket.

7 - Place spring and diaphragm in position. Engage the diaphragm pull rod in the rocker arm link. Replace diaphragm if showing signs of cracks or hardening.

8 - Place fuel pump body in a vise with the Gauge VW 328b inserted. Thus the rocker arm is pressed 35 mm (1.4") inwards (measured from flange jointing face), bringing the diaphragm to the required assembling position.



9 - Place the pump cover in position, taking care that the diaphragm is not creased up. Securely tighten cover screws diagonally.

10 - Fill lower pump chamber with Universal Grease VW - A 052 (anti-freeze). The grease assumes a liquid condition at operating temperature, ensuring a proper lubrication of all moving parts. The lubrication is improved by the engine oil which is fed into the pump chamber through the push rod bore in the fiber flange, rendering another grease packing unnecessary. Rocker arms and push rods which are devoid of grease or oil indicate a leaky diaphragm.

Note. - Only use genuine SOLEX Spare Parts to assure a perfect functioning of the fuel system under all conditions of operation.

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Fuel Pump Trouble Checking

Symptoms	Cause	Remedy
1 - Pump leaky at jointing faces: Loss of fuel	a - Slotted screws insecure	a - Tighten screws
	b - Diaphragm cracked	b - Renew diaphragm (VW 328b)
2 - Diaphragm leaks at rivets: Loss of fuel	Diaphragm damaged by unskilled assembly	Renew diaphragm (VW 328b)
3 - Diaphragm material leaky: Loss of fuel	Diaphragm material damaged by solvent substance in fuel	Renew diaphragm (VW 328b)
4 - Excessive pump stroke: Overstraining the diaphragm	Pump incorrectly installed, gasket too thin	Correctly install pump (VW 328a), check diaphragm, if necessary
5 - Pump pressure low	a - Pump incorrectly installed, gasket too thick	a - Correctly install pump (VW 328a)
	b - Spring pressure low	b - Renew spring or, if necessary stretch it apart
6 - Pump pressure excessive: Float needle valve forced down	a - Pump incorrectly installed, gasket too thin	a - Correctly install pump (VW 328a)
	b - Spring pressure excessive	b - Renew spring or, if necessary, bring intermediate turns further together
7 - Fuel pump inoperative or insufficient fuel delivery	Valves leaky or sticking	Check valves, renew valves and valve seats, if necessary

The fuel tank, capacity 40 liters (10.5 U.S. gals.; 8.8 Imp. gals.) including a fuel reserve of 5 liters 1.3 U.S. gals.; 1.1 Imp. gals.), is accessible by lifting the front bonnet. The tank is provided with a large filler opening.

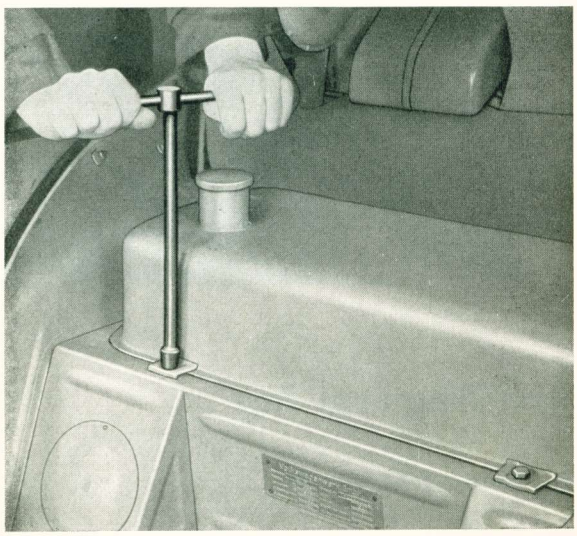
Removing and Installing Fuel Tank

Removal

1 - Close the fuel tap and disconnect fuel hose from fuel pipe.

2 - Remove split pin at the end of the fuel tap operating rod, with the r.h. front wheel taken off, and remove operating rod.

3 - Unsrew the four tank mounting screws and lift off the tank.



4 - Remove fuel tap.

5 - Flush tank with fuel and blow it out with compressed air.

Installation

This is a reversal of the removal procedure, but the following points should be noted:

1 - Place fuel tank anti-squeak packing in position; renew packing if damaged.

2 - The fuel tap operating rod must neither be tight nor rattle in its guide hole in the body. Note correct seating of grommet. Rods having a tight fit should be installed with the use of French chalk or brake fluid (Caution! Brake fluid has a detrimental effect on the paint).

Note:

The fuel tank used on cars up to Chassis No. 1 - 0 116 375 is no longer available as a spare part. When new tanks are required, use the latest pattern and modify the body as detailed below:

1 - Cut out left and right tank supports, including the angle plates, and weld in the latest pattern supports. Extend the front and rear edges of the tank mounting aperture up to the cowl side panels.

2 - Attach fuse box to cowl side panel.

3 - Drill hole in center for fuel tap operating rod and plug up the old hole.

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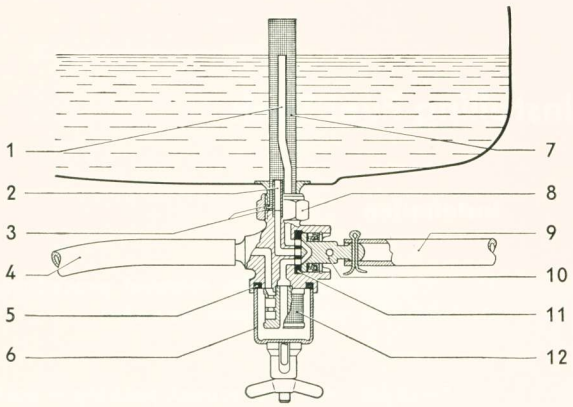
Fuel Tap

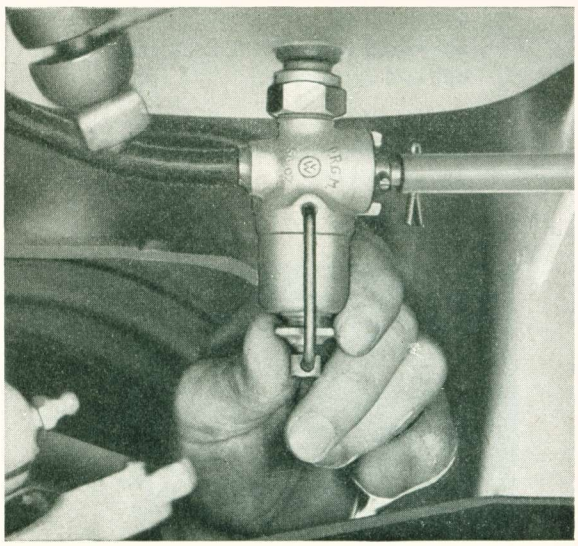
Fuel passes through a filter in the tank via the fuel tap and another filter into the fuel line. The tap is operated from the front seat. Its three positions are: A (= open), Z (= shut off), R (=reserve).



1 - Drain line with the tap set at "open"
2 - Drain line with the tap set at "reserve"
3 - Gasket
4 - Fuel hose
5 - Gasket
6 - Filter bowl
7 - Filter in tank
8 - Fuel tap nut
9 - Operating rod
10 - Three-way tap
11 - Three-way tap gasket
12 - Filter

Cleaning

To remove the filter, loosen the knurled nut or wing nut at the bowl base and remove the bowl. Screw out the filter and clean it. With the tank in situ, the tap is accessible from under the car, or, after one front wheel has been removed, from the side, or through the right-hand inspection hole in the body. The filter should be cleaned in fuel and afterwards dried with compressed air. After assembly, check tap for leaks.



Removing and Installing Fuel Tap

To clean the fuel tank and the filter in the fuel tank, the tap must be removed.

Removal

1 - Remove and drain fuel tank.

2 - Release fuel tap and remove tap.

3 - Clean filter with compressed air.

Installation

This is a reversal of the removal procedure, but the following points should be noted:

1 - Thoroughly clean fuel tank.

2 - Renew gaskets.

3 - After installation, check connections for leaks.

Reconditioning Fuel Tap

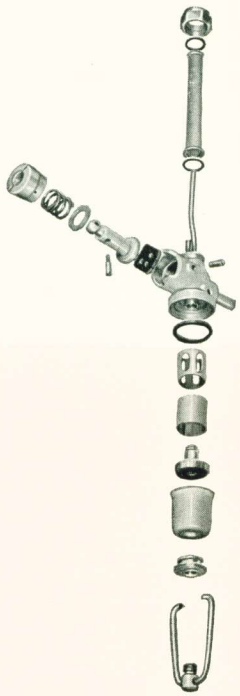
Disassembly

Two types of fuel tap are used in series production.

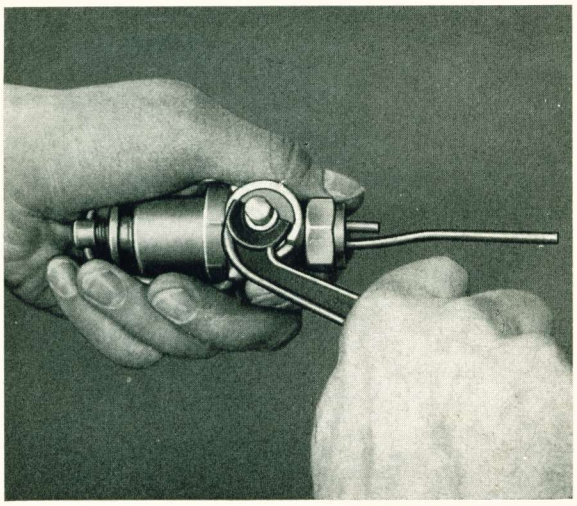
Type A (with knurled nut)

1 - Remove fuel tap.

2 - Screw out stop of three-way tap. Release lockscrew for ring screw.



3 - Remove three-way tap and rubber seal, using hook spanner for fuel tap.



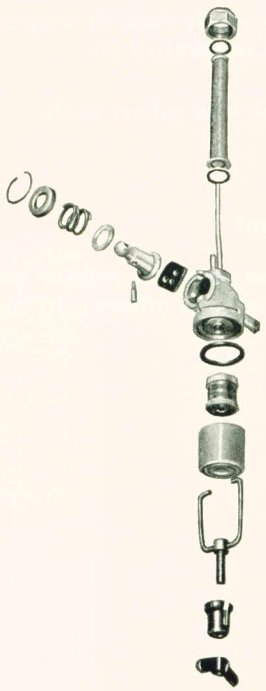
4 - Release knurled nut and remove bowl.

5 - Unscrew filter retaining screw and remove filter.

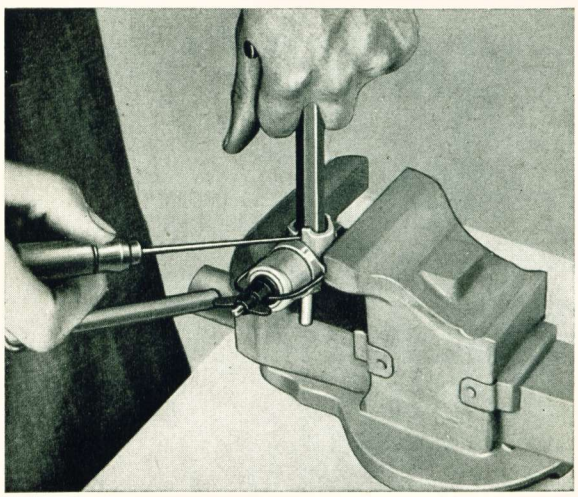
Type B (with wing nut)

1 - Remove fuel tap.

2 - Screw out stop of three-way tap.



3 - Press down ring cap with a piece of tube and remove circlip.



4 - Remove three-way tap and rubber seal.

5 - Release wing nut and remove bowl.

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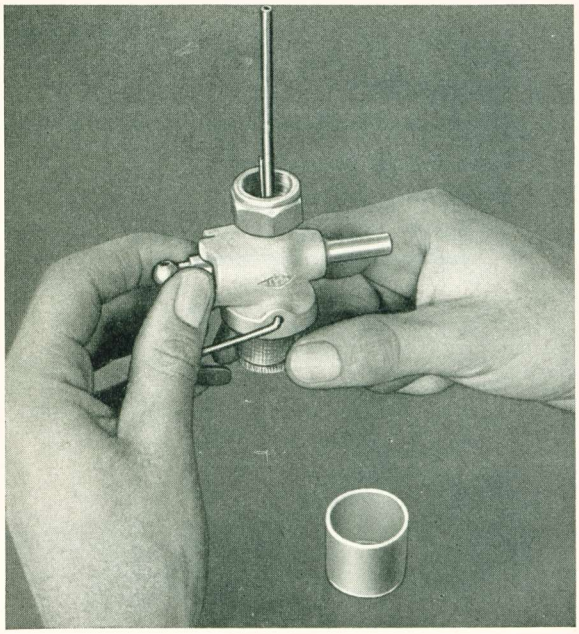
6 - Unscrew filter retaining screw and remove filter.



Assembly

This is a reversal of the preceding operations, but the following points should be observed:

1 - Thoroughly clean all components and dry them with compressed air.

2 - Install new rubber parts.

Important

Onyl use genuine rubber parts supplied by the factory, as others will be affected by the fuel.

Fine Fuel Filter

(Optional fitting)

General

The filter in the fuel tap is generally sufficient to exclude dust and water. An additional filter may be fitted in such cases where fuel is filled into the tank mostly from barrels or cans, when dirt is likely to enter the fuel system. This filter can be obtained as an extra part.

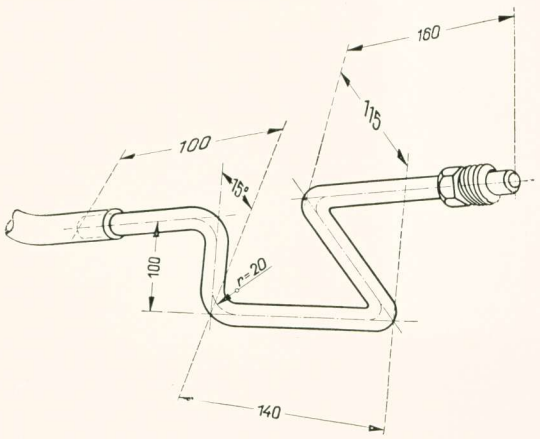
Installation

1 - Shut off the fuel tap.

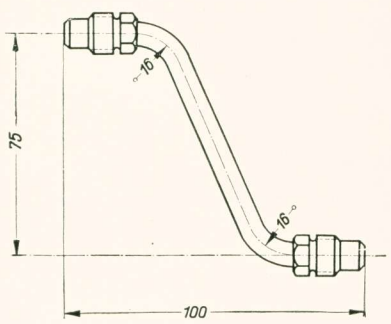
2 - Disconnect fuel hose from pipe leading to fuel pump (use open end spanner).

3 - Remove fuel line to fuel pump.

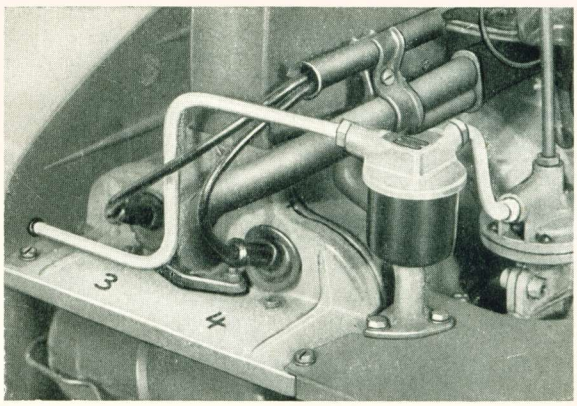
4 - Bend fuel line to fuel filter as shown below.



5 - Bend fuel line between filter and fuel pump — as shown below. Only use copper-plated pipes.



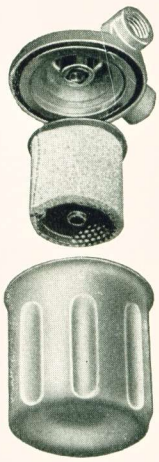
6 - Install filter and fuel lines. Connect fuel hose and open the fuel tap.



Cleaning

1 - Unscrew bowl.

2 - Remove and wash filter insert. Renew if damaged.



3 - Clean filter housing.

4 - Assemble filter. Note correct position of gasket.

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Fuel Tank

(From August 1955)

The fuel tank has a capacity of 40 liters (10.5 U.S. gals.; 8.8 Imp. gals.). Access is obtained through the rear-hinged front hood.

Fuel Tank Removal and Installation

Removal

1 - Lift out spare wheel, jack, and tools.

2 - Remove luggage space floor cover.

3 - Shut the fuel tap.

4 - Remove cotter pin at the end of the fuel tap operating rod, with the r.h. front wheel taken off, and withdraw operating rod.

5 - Pull the flexible fuel hose off the fuel tap.

6 - Remove the four tank retaining screws and lift off the tank.

7 - Remove fuel tap.

8 - Flush the tank with fuel and blow it out with compressed air.

Installation

To install, reverse the preceding operations and observe the following points.

1 - Place fuel tank anti-squeak packing in position; renew packing if damaged.

Note:

From Chassis No. 1 600 440 a 6 mm (.236") thick seal of foam material is installed between fuel tank flange and the luggage compartment floor as a protection against water and dirt. This seal may subsequently be installed on all VW Passenger Cars from Chassis No. 1 - 0 929 746. It is recommended to cement the seal to the underside of the flange prior to installation of the tank, preferably with Universal Glue D 12.

2 - The fuel tap operating rod must neither be tight nor rattle in its hole in the body. Note correct seating of grommet. Rods having a tight fit should be installed after applying French chalk or brake fluid (Caution: Brake fluid will affect paint).

Note:

The fuel tank filler cap serves the dual purpose of providing a seal and compensating any difference in the pressures of the atmosphere and the tank.

If fuel leaks out at the filler cap, proceed as follows to eliminate the source of the trouble:

1 - Remove the cap and make sure that the cork gasket is of a thickness of at least 2.3 mm (.09") and sufficiently supple. Renew hard or damaged gaskets. If no new gasket is available, place old gasket for a few minutes in warm water and reinstall it.

2 - Check filler orifice edge for evenness (e.g. with a glass plate and a feeler gauge). Permissible unevenness: 0.1 mm (.004"). Greater deviations and damage, which might have been caused in refueling, are not compensated by the cap gasket. In such cases, smooth off the filler orifice edge with a finishing file. Make sure that no metal chips drop into the tank. If necessary, flush out the tank.

3 - If no remedy is effected by the above measures, replace the filler cap, as the valve or the sealing in the cap is then likely to be defective.

Note:

If a proper sealing cannot be effected in workshops, a rubber gasket for sealing the cap to the filler orifice is available as a Service Part.

Part No. 111 201 557 B = 100 mm ∅
,, ,, 111 201 557 C = 80 mm ∅
,, ,, 211 201 557 A = 60 mm ∅

The material of this gasket is very supple, assuring a better seal in cases of greater irregularities in the filler contact surface that are difficult to remove.

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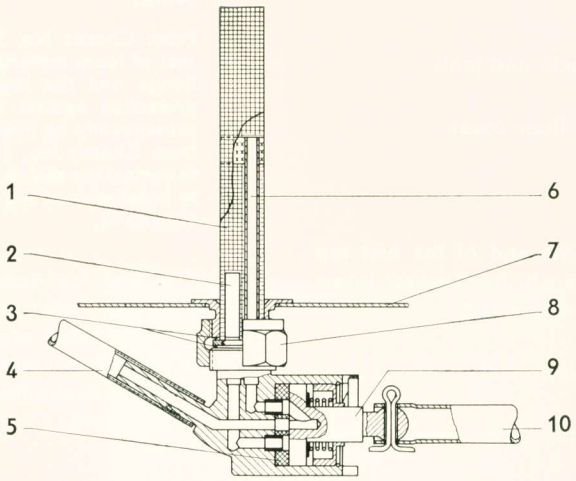
Fuel Tap

Fuel passes through a filter in the tank via the fuel tap into the fuel line. The tap is operated from the front seat. Its three positions are: "open", "reserve", and "shut off".



1 - Filter
2 - Drain line with the tap set at "reserve"
3 - Gasket
4 - Fuel line connection
5 - Three-way tap seal
6 - Drain line with the tap set at "open"
7 - Fuel tank
8 - Union nut
9 - Three-way tap
10 - Operating lever

Fuel Tap Removal and Installation

To clean the filter and the tank, the tap must be removed.

Removal

1 - Remove and drain fuel tank.

2 - Loosen fuel tap nut and take off the tap.

3 - Clean filter with compressed air.

Installation

Reverse the preceding operations and observe the following points:

1 - Carefully clean fuel tank.

2 - Use new fuel tap gaskets.

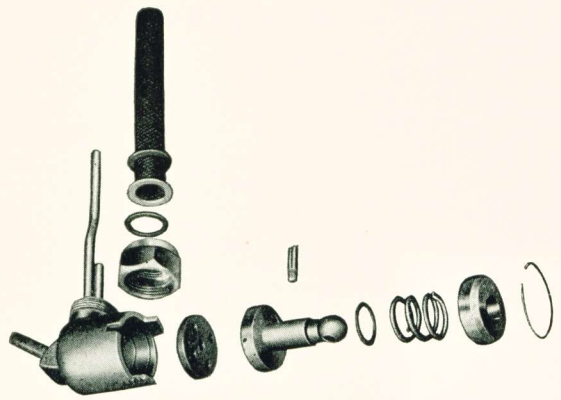
Note!

The cork disc between the filter and the long drain pipe should be nearly flush with the upper edge of the pipe.

3 - After installation, check connections for tightness.

Reconditioning Fuel Tap

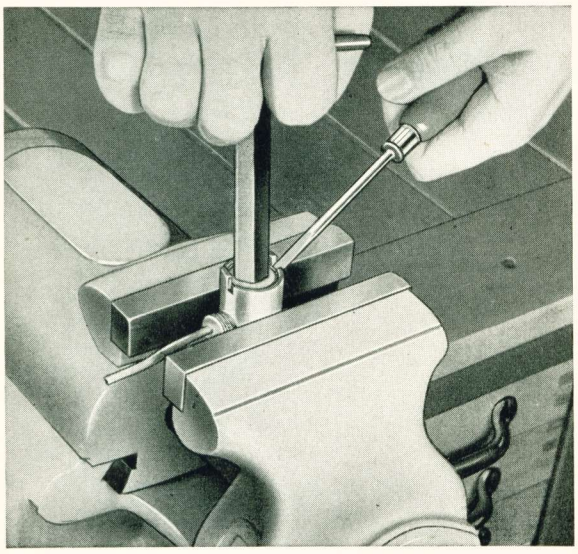
Disassembly



Remove the fuel tap and proceed in the following order:

1 - Screw out stop of three-way tap.

2 - Press down ring cap with a piece of tube and remove retaining ring.



3 - Remove three-way tap and seal.

Assembly

This is the reversal of the preceding operations, but the following points should be observed:

1 - Thoroughly clean all components and dry them with compressed air.

2 - Use new seal.

> **Important**
>
> Only use genuine seal supplied by the factory, as others are liable to be affected by fuel.

3 - Push the rubber seal over the provided locating tubes.

Note:

On cars which have been in service for a prolonged period of time the fuel tap control may become difficult to actuate due to stiffness, and may possibly cause the cotter pin linking the control rod with the tap to shear off. Such stiffness should be overcome as described below:

Fuel Tap Control

1 - Remove, disassemble, and clean fuel tap.

2 - Smooth down frictional contact surfaces of three-way tap ring cap and tap housing with extremely fine emery cloth and apply graphite grease prior to assembly. Care should be taken that the grease is evenly and thinly spread with a clean rag.

3 - The cotter pin has only a slight clearance in the holes of the control rod and the tap. Make sure that the control rod is in line with the tap stem, as a tilted position of the tap will result in fuel leakage.

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Note:

From Chassis No. 1 498 843 the gasket between filter and fuel tap has been omitted on approximately 31 000 VW Passenger Cars. A seal is insured by a press fit between filter and fuel tap housing. The upper gasket between the fuel tank and the filter will be installed as before.

The purpose of this alteration is to do away with leaks at the fuel tap because of an eccentrically positioned gasket.

Inspection of Fuel System

If the fuel supply to the carburetor is interrupted, check as outlined below.

Sequence of Operations

1 - Check quantity of fuel in tank. The air vent hole in the fuel tank filler cap must not be obstructed.

2 - Check position of fuel tap.

3 - Disconnect fuel line at the carburetor, leaving a free outlet from the pump. Apply the starter button with the spark plug leads disconnected and check if fuel is delivered by the pump.

a - If fuel is delivered by the pump: Check pump pressure. Inspect float needle valve and carburetor jets for dirt and foreign matter.

b - If no fuel is delivered by the pump:

4 - Disconnect fuel line to fuel pump.

a - If fuel is coming out: Check fuel pump for leaks. Retighten screws and connections; remove and check fuel pump, if necessary.

b - If no fuel is coming out:

5 - Remove fuel tank; check fuel tap; clean filter; inspect gaskets.

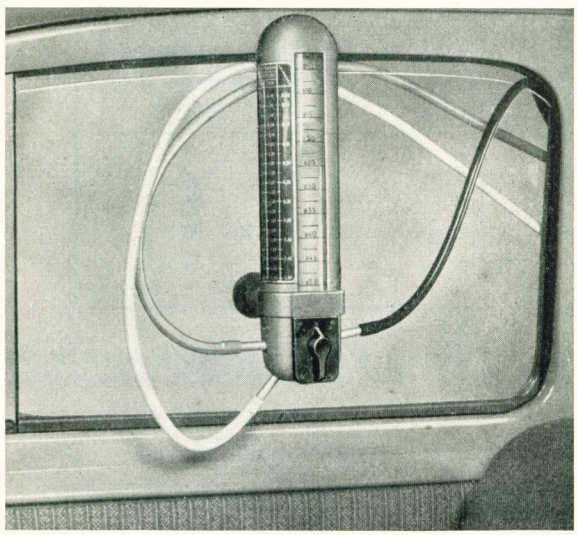
6 - Connect fuel line to compressed air line.

Fuel-Mileage Test

Mileage Test in Car

(Average consumption)

An accurate measurement of the fuel consumed can be made with a fuel-mileage tester which should be installed near the driver's seat. The fuel-mileage tester is connected to the engine by means of hoses. A switch should allow the test system to be cut out.



If the test result corresponds to the figures given by the factory, the driving habit or special operating conditions are responsible for a high fuel consumption.

To carry out the test, the following points should be noted:

1 - Adjustment of fuel pump, carburetor and ignition must be correct.

2 - The engine must have attained operating temperature before conducting the test.

3 - The car must be normally laden.

4 - Conduct the test on a level road and under average driving conditions. Periods of idling, stop and go operation, short trips resulting in insufficient warm-up, rapid acceleration, and driving at top speed have a definite effect on the fuel consumption.

5 - Only trade-mark fuel should be used. The consumption should be determined as follows:

$$\text{Liter per 100 km (metric)} = \frac{\text{Fuel consumed (liter)}}{\text{Length of test course (km)}} \times 100$$

6 - The engine and the fuel system should be thoroughly checked, if there is a considerable difference between the result of the fuel-mileage test carried out as outlined above and the nominal fuel consumption figures given by the factory.

Note. - A fuel-mileage test by means of a fuel level gauge and the mileage recorder generally gives only an approximate fuel consumption figure and should, therefore, be avoided.

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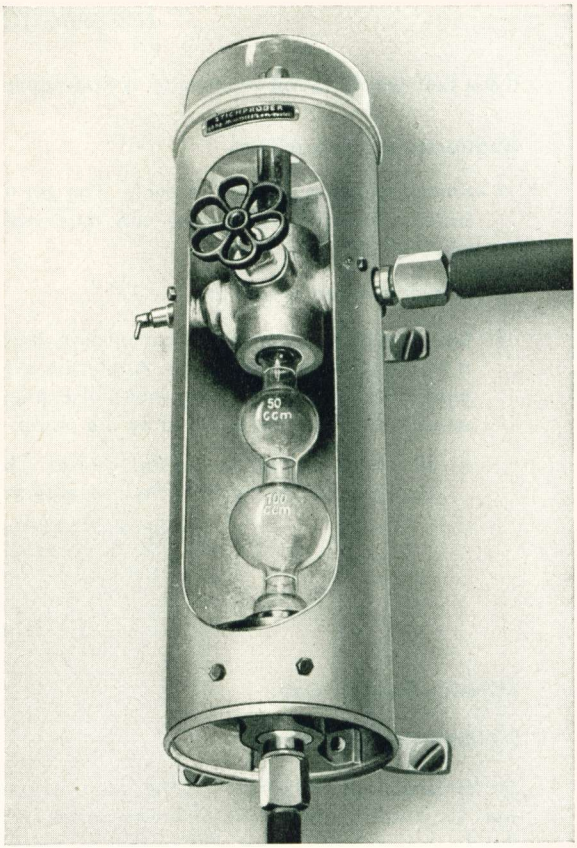
Fuel Consumption Test on Engine Test Bench

The fuel consumption can also be checked on the engine test bench by means of a gauged test container and a stop-watch. The consumption can be determined by making the engine subject to a given load and speed during a fixed time.

The consumption figures for 100 cu. cm (6 cu. ins.) are given in the chart below.



Example:

With a speed of 100 r.p.m. and a brake load of 4.60 kg (10 lbs.), 100 cu. cm (6 cu. ins.) should be used up within 86 and 93 seconds.

The chart only applies to engines which are completely broken in (run in) and equipped with a SOLEX Carburetor 28 PCI.

The chart contains only the speeds equivalent to 50 km p. h. (30 miles), 70 km p. h. (45 miles), 90 km p. h. (55 miles), and full throttle. All further measurements at other speeds are unnecessary, as the characteristic of the consumption is equal throughout the total range of load.

Brake Load (kg)	R.P.M.	Time for consumption of 100 cu. cm (6 cu. ins.) fuel (seconds)
3.2	1500 (50 km p.h./30 m.p.h.)	131 —145
4.6	2100 (70 km p.h./45 m.p.h.)	86 — 93
6.45	2700 (90 km p.h./55 m.p.h.)	54.5— 58.0
8.00—8.3	3000 (full throttle)	40 — 43.5

Note. - Generally, the brake load is between 8.0 and 8.3 kg at 3000 r.p.m. If a higher brake load is reached, the time for the consumption of 100 cu. cm (6.0 cu. ins.) may go down to 38.5 sec. If the given brake load is not reached, the consumption may require 44.5 sec.

Carburetor Adjustment

Specification Data	Compression Ratio	
	6.1	6.6
Venturi	21.5 mm dia.	21.5 mm dia.
Main jet	122.5	117.5
Air correction jet	200	195
Pilot jet	50	50
Pilot jet air bleed	0.8 mm dia.	0.8 mm dia.
Pump jet	50	50
Pump air correction jet	2.0	2.0
Emulsion tube	29	29
Float needle valve	1.5	1.5
Float weight	12.5 grams	12.5 grams
Pump feed	0.50 ± 0.10 c.c. per stroke	0.50 ± 0.10 c.c. per stroke

Fuel Consumption Test on Brake

Brake load (kg)	Engine speed (r.p.m.)	Corresponding car speed (km)	(miles)	Time for consumption of 100 c.c. (6 cu. ins.) fuel in seconds 6.1 Ratio	6.6 Ratio
3.15	1500	50	31	128 —138	138 —148
4.65	2100	70	43	85 — 92	90 — 97
6.65	2700	90	56	54.5— 58.5	55.5— 59.5
7.85	3000	100	62	43 — 46	43 — 47
8.7—9.1	3400	Full throttle		33 — 36	34 — 37

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Carburetor "Icing"

During the cold season, some VW owners complain about poor acceleration and a tendency of the engine to stall when idling, coupled with an excessive fuel consumption. A thorough check usually does not reveal any defect or maladjustment. An "icing" of the carburetor if frequently found to be reponsible for the trouble.

This phenomenon is caused by certain weather conditions. It may occur at temperatures between 0° and +10° C (32° and 50° F). Temperatures between +2° and +6° C (35,6° and 42,8° F) have proved to be particularly critical in this connection. The degree of humidity has, apart from the temperature, an important bearing on „icing". The tendency of the carburetor to freeze up is promoted at a humidity in excess of 70 per cent.

Following are the symptoms of carburetor "icing":

a - Engine stalls when idling. This may happen even after a longer period of operation (10—15 minutes) in city traffic. The best proof that the stalling is attributable to "icing" is when the engine runs smoothly again after having waited for a few minutes with the engine idling. The reason for the stalling is ice forming on the throttle valve and freezing up the space between throttle valve and carburetor throat. It is also possible that the idle port is blocked by ice.

b - Poor acceleration under small loads. This is also caused by the conditions detailed under "a-". The ice will melt when the carburetor receives sufficient heat from the engine. That is why any ice will hardly be detected in checking the engine at the workshop.

c - It is possible that ice will form at the air correction jet and at the mixture outlet holes in the spraying well, which may substantially increase the fuel consumption.

The tendency of the carburetor to freeze varies with the various brands and grades of fuel. It can be diminished by adding anti-freeze agents to the fuel. Some well-known brands of fuel contain such agents, at least during the critical season.

Preignition

The commercial fuels of some countries vary quite considerably in respect to certain qualities which are not exactly laid down in the usual specifications. This also applies to the self-ignition temperature of the fuel. With a somewhat lower self-ignition temperature preignition can occur in the engine, especially under the following circumstances:

1 - Incorrect carburetor idling adjustment (too rich or too fast).

2 - Incorrect ignition timing.

3 - Incorrect cooling air throttle ring adjustment.

4 - Excessive accumulation of combustion residues in combustion chambers in connection with working conditions, way of driving and fuel used.

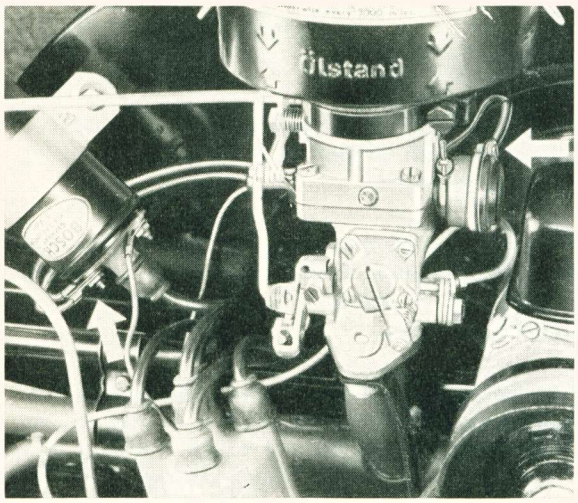
5 - Inadequate cooling of the engine owing to insufficient tension of the fan belt or dirty exterior of the engine.

In exceptional cases where preignition cannot be dealt with satisfactorily in the workshop, a pilot jet with electro-magnetic shut-off valve (Part No. 111 129 413) is available for service installation.

Installation:

a - Remove standard pilot jet and install pilot jet with electro-magnetic shut-off valve.

b - Attach connecting cable to terminal of pilot jet with electro-magnetic shut-off valve and to terminal 15 of the ignition coil (length of the cable about 400 mm/15.74").



Operation

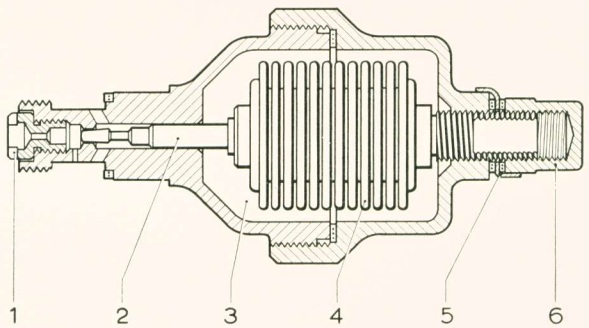
When the ignition is turned off, the jet needle, operated by an electromagnet, closes the pilot jet so that no more fuel can pass through. This practically eliminates preignition. The jet is opened again by turning the ignition on.

By turning the hand lever the electromagnet is switched off. The pilot jet with electro-magnetic shut-off valve is switched on when the handle of the lever points towards the fan housing. In the opposite position it works like an ordinary pilot jet.

For cleaning purposes the jet piece can be removed from the housing. Maintenance other than this is not necessary.

High Altitude Corrector

To ensure satisfactory mixing in the carburetor even at high altitudes, a high altitude corrector (Spare Part No. 111 129 501) can be fitted in 1192 cu. cm engines in place of the main jet carrier.



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Operation of the high altitude corrector

The main jet carrier is replaced by the high altitude corrector which is mounted in the same manner as the main jet carrier.

The main jet (1) through which the fuel, coming through an annular chamber from the float housing, has to pass, is screwed to one end of the high altitude corrector.

The fuel is supplied to the main jet through 4 oblique bores, and through a small bore between the main jet and the 4 oblique bores. The fuel also flows into the thermostat chamber (3).

The governor thermostat (4) is supported axially and fixed in position at the end opposite to the main jet, by means of a pin which is screwed into the housing. Mounted at the other end of the thermostat, the needle (2) slides freely in the passage leading to the main jet.

As the thermostat (4) expands due to the atmosperic pressure at high altitude, the needle throttles progressively the fuel supply for the main jet i.e. the change in atmospheric pressure alters the length of the thermostat and, consequently, the position of the needle, thus governing the fuel supply.

At sea level, the needle will be in a position which does not affect fuel consumption.

Caution

When the high altitude corrector is mounted, the governor thermostat is properly set by means of the adjusting nut (6) which is secured with a lock washer (5). This adjustment must not be altered by any means.

1 - VW Special Service Tools

VW 126a	Fuel Pump Wrench
VW 328a	Fuel Pump Push Rod Gage
VW 328b	Fuel Pump Diaphragm Gage

2 - VW Workshop Equipment for Local Manufacture

(The earlier VW Number is given in brackets)

VW 663	(VW 364) Fuel Pump Tester

3 - Normal Hand Tools

Screwdriver, 6 mm
Carburetor screwdriver
Combination pliers
Pipe wrench
Mechanic's hammer, 300 grams
Triangular scraper
Open-end wrench, 8 mm
Open-end wrench, 11 mm
Open-end wrench, 12 mm
Open-end wrench, 14 mm
Open-end wrench, 17 mm
Box wrench, 14 mm
Box wrench, 17 mm
C-shaped box wrench (Starterblockschlüssel)
Wire brush
Hand vice
Oil-can
Can for derusting fluid
Grease container
Scratch awl
Caliper square, 300 mm in length, measuring 1/50 mm
Tap M 6
Die stock, size 1
Die M 6
Tap wrench, size 1, adjustable
Drill, 5.0 mm
Drill, 7.0 mm
Inspection lamp with cable and plug
Electric drill

4 - Supplementary Workshop Equipment

Fuel mileage tester
Engine test stand

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