Description of Carburetors

I. Downdraft Carburetor for Models 180, 180 a and 180 b

Models 180 and 180 a

A. General

Models 180 and 180 a are equipped with a Solex downdraft carburetor Type 32 PICB. This carburetor has a suction canal with a diameter of 32 mm and a central air entry. The starter mechanism, the idle system, the main carburetion system as well as the accelerating pump work essentially on the same principles as the double-downdraft carburetor (Fig. 07-0/1).

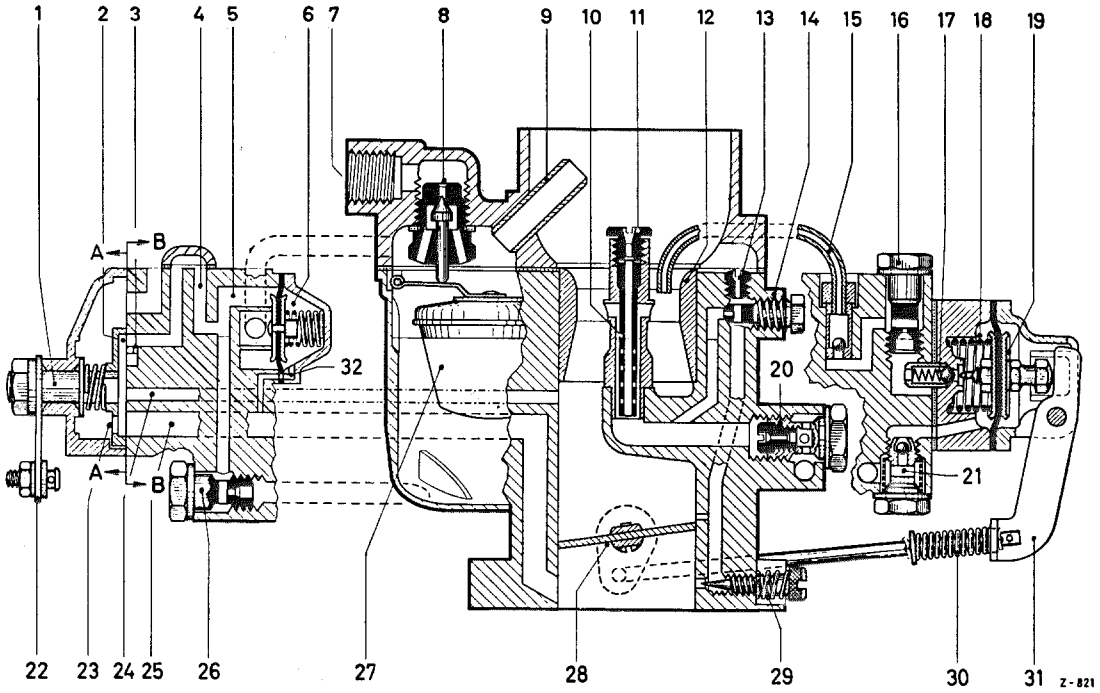


Fig. 07-0/1

Solex Carburetor Type 32 PICB

1 Starter rotary slide valve
2 Graded intake bore in starter flange for fuel canal (4)
3 Graded intake bore in starter flange for fuel slot (39)
4 Fuel canal to starter system
5 Air canal from starter air valve to fuel canal (4)
6 Starter air valve
7 Fuel-line connection in carburetor cover
8 Float neddle valve
9 Vent tube for float chamber
10 Mixing tube holder with mixing tube
11 Air correction jet
12 Air horn
13 Idle air jet
14 Idle fuel jet
15 Injection tube
16 Pump jet
17 Ball valve
18 Diaphragm spring
19 Pump diaphragm
20 Main jet plug with main jet
21 Ball valve
22 Starter lever
23 Starter air bore in starter rotary slide valve
24 Additional air canal
25 Starter mixture canal
26 Starter fuel jet
27 Float
28 Throttle valve
29 Idle mixture adjustment screw
30 Connecting rod with pressure spring
31 Pump arm
32 Vacuum canal for starter air valve

B. Starter Mechanism

The starter mechanism of the carburetor works in two stages on the rotary slide valve principle. The starter mechanism is actuated by a bowden cable with a pull knob on the instrument panel. If the starter knob is pulled right out, the starter mechanism is set to the "cold-start position". If the starter knob is pressed in about halfway, the starter mechanism is set to the "warm-up position". If the starter knob is pressed in completely, the starter mechanism is out of operation.

Connecting the choke control is described in Job No. 30-6.

a) Cold Start Position

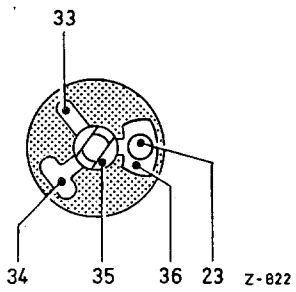
(Starter knob pulled right out)

In this position of the starter mechanism the bore (23) in the starter rotary slide valve is in the center of the starter mixture canal (25) in the starter flange of the carburetor housing.

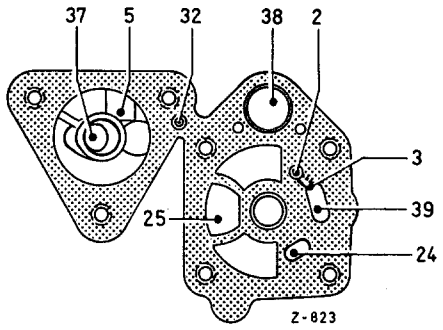
In the 1st phase of the cold start the partial vacuum obtaining in the suction tube exerts an influence on the starter system via the starter mixture canal (25) when the engine is being started. As a result fuel from the float chamber is drawn into the fuel canal (4) through the starter fuel jet (26). A certain amount of air enters at the same time through the notch in the carburetor cover which connects up with the float chamber; as a result a kind of pre-mixture is present in the fuel canal (4) leading to the starter rotary slide valve.

The notch is designed above all to prevent fuel from being drawn up by the siphon effect when the starter mechanism is inoperative and if the starter rotary slide valve should have a slight leak.

The pre-mixture enters the chamber (33) of the starter rotary slide valve through the graded bore (2) of the fuel canal (4) (Figs. 07-0/1 and 07-0/2).



Starter rotary slide valve



Starter flange of carburetor housing

Fig. 07-0/2

2 Graded bore of fuel canal (4)
3 Graded intake bore in starter flange for fuel slot (39)
5 Air canal form starter air valve to fuel canal (4)
23 Starter air bore in starter rotary slide valve
24 Additional air canal
25 Starter mixture canal
32 Vacuum canal for starter air valve
33 Chamber in starter rotary slide valve
34 Chamber in starter rotary slide valve
35 Mixing chamber in starter rotary slide valve
36 Cavity in starter rotary slide valve
37 Air canal from float chamber to starter air valve
38 Starter air canal
39 Fuel slot in starter flange

At the same time air is drawn from the suction canal of the carburetor via the canal (24) into the chamber (34) of the starter rotary slide valve. This additional air combines with the pre-mixture in the mixing chamber (35) of the starter rotary slide valve. From the mixing chamber this fuel-air mixture passes into the cavity (36) of the starter rotary slide valve. Here it mixes with the air which comes via the starter air canal (38) through the starter air bore (23) in the starter rotary slide valve which acts as a starter air jet. Through the starter mixture canal (25) this mixture now passes into the suction canal of the carburetor where it combines with the air streaming through the throttle valve gap to produce the finished starting mixture. Fig. 07-0/3 shows the mode of action of the starter mechanism during the 1st phase when the engine is being started.

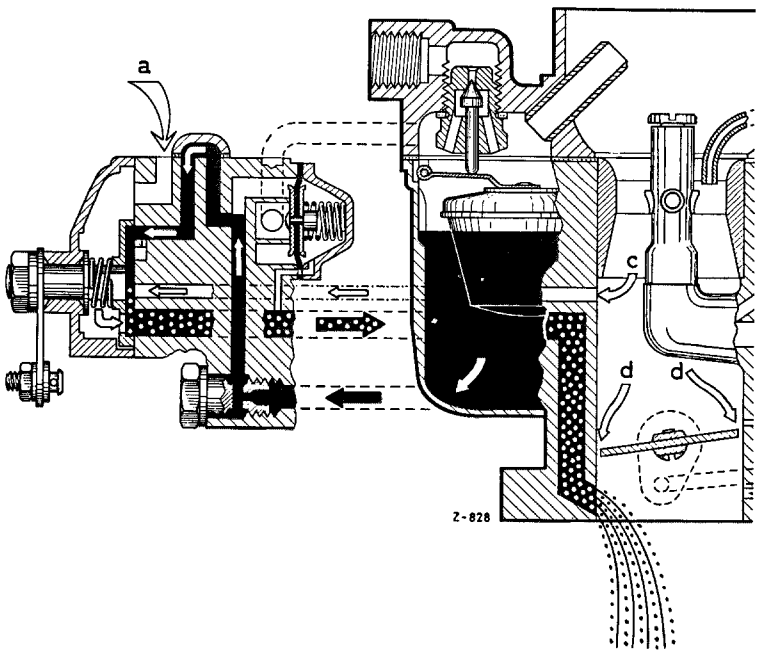


Fig. 07-0/3

Cold start — Phase 1
When starting the engine
(Starter air valve closed)

a) Starter air entry
c) Additional air entry from suction canal
d) Main air entering through throttle valve gap

As soon as the engine has started, the 2nd phase of the cold start begins. The increase in engine speed brings about an effective partial vacuum beneath the throttle valve. This partial vacuum exerts a pull on the spring-loaded side of the diaphragm of the starter air valve (6) via the vacuum canal (32) (see Fig. 07-0/4).

Due to the partial vacuum effect the starter air valve opens and admits more air to the starter system from the float chamber via the air canal (5) and the fuel canal (4). This additional air immediately leans out the starting mixture after the engine has started, thus ensuring the proper running conditions for the engine. Fig. 07-0/4 shows the mode action of the starter mechanism after the engine has started.

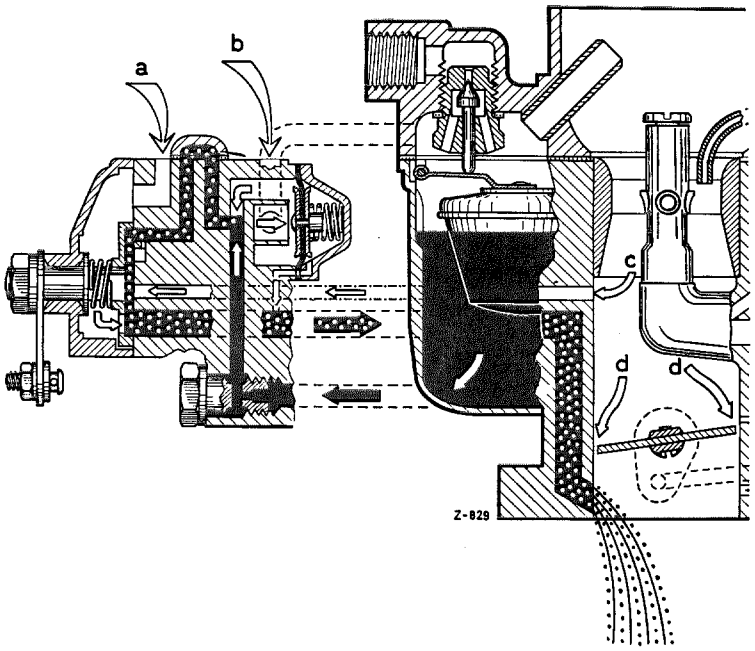


Fig. 07-0/4

Cold start — Phase 2
After the engine has started
(Starter air valve opened)

a) Starter air entry
b) Additional air entry via the starter air valve
c) Additional air entry from suction canal
d) Main air entering through throttle valve gap

b) Warm-Up Position

(Starter knob pushed halfway in)

As soon as the engine has warmed up a little, the starter knob can be pushed in halfway. As a result, the starter rotary slide valve is turned toward the right via the starter lever (22); the chamber (33) of the slide valve is now opposite the slot (39) of the starter flange (see Fig. 07-02). Since the chamber (33) is no longer connected with the fuel canal (4) by the bore (2), but only by the fine-graded bore (3), the amount of fuel admitted is greatly decreased and the start mixture is leaned out further. Fig. 07-0/5 shows the mode of action of the starter mechanism during warming-up.

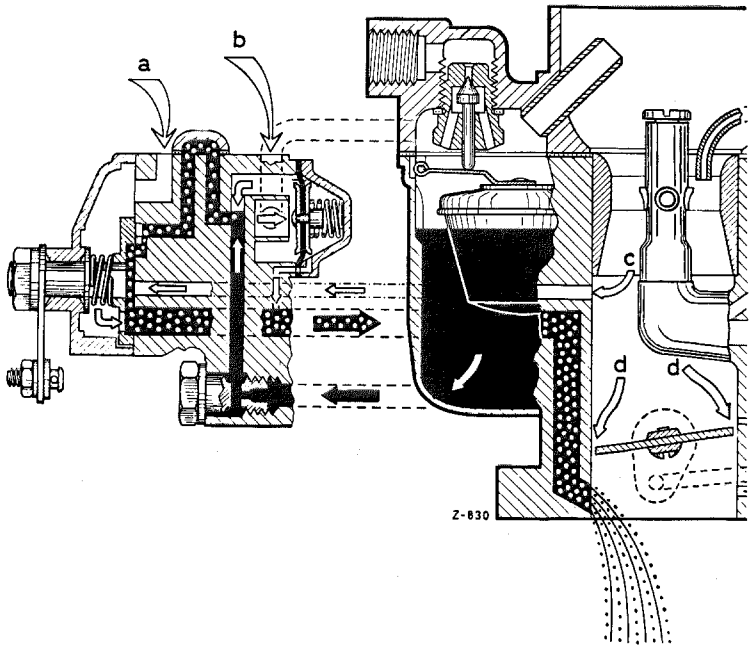


Fig. 07-0/5

Warm-up position
(Starter air valve open)

a) Starter air entry
b) Additional air entry via the starter air valve for attenuating the start mixture
c) Additional air entry from suction canal
d) Main air entering through throttle valve gap

c) Driving Away with Starter Knob Pulled Out

When the car is driven away with the starter knob pulled out, the partial vacuum in the suction canal is transferred upward by the opening of the throttle valve. As a result, the supply of start mixture from the canal (25) decreases. This is compensated for by the start mixture drawn in via the additional air canal (24) so that the supply of start mixture to the engine remains unaffected.

If as a result of quick acceleration from low engine speed the throttle valve is opened still further, the partial vacuum suddenly drops. The starter aire valve (6) which had opened immediately the engine started now closes again so that the starter system produces a rich start mixture for the change-over just as it did at starting. As soon as the engine reaches sufficient speed, the starter air valve, actuated by the partial vacuum which is increasing again, once more opens and leans out the start mixture. By this automatic action of the starter air valve the cold engine is supplied with a correctly proportioned start mixture suitable for all conditions and a satisfactory change-over to the main carburetion system is ensured when the starter knob is pulled. Fig. 07-0/6 shows the mode of action of the starter mechanism when the car is being driven away.

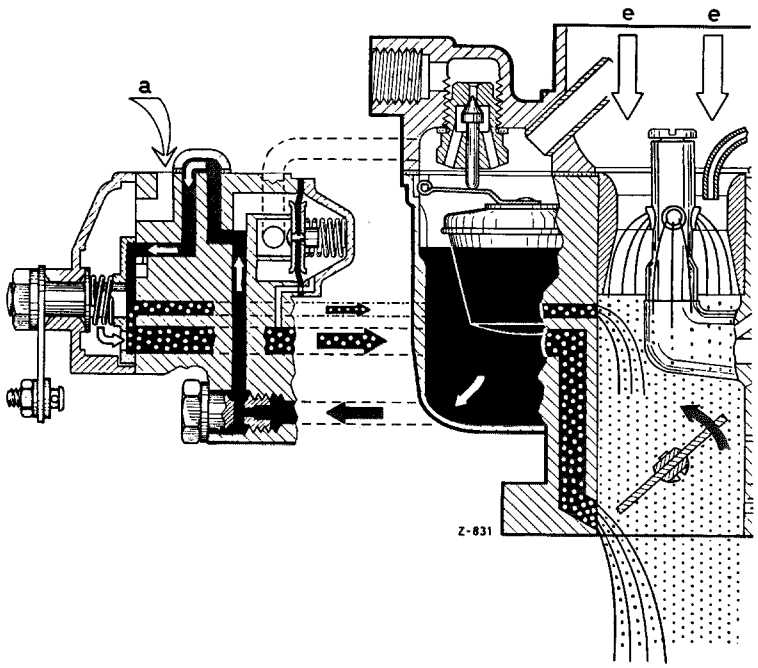


Fig. 07-0/6

Change-over with starter mechanism in action
(Starter air valve closed)

a) Starter air entry
e) Main air supply

Note: As a rule the car should be driven away with the starter mechanism in the "warm-up position". However, at very low temperatures the car can be driven away with the starter mechanism in the "cold-start position".

d) Starter Mechanism Inoperative

(Starter knob pushed right in)

When the starter knob is pushed right in, the starter rotary slide valve is turned to the right to a point where both the graded bore (2) and the slot (39) in the starter flange are completely covered. The starter mixture canal (25) is also closed. The starter system is now put out of action. In order to prevent fuel from being drawn from the starter system, when the starter mechanism is inoperative, but if the starter rotary slide valve is not quite tight, a notch as described in Section a) has been made in the carburetor cover. This notch connects the float chamber with the fuel canal (4). For that reason only air and no fuel can be drawn in from the starter system, when a slight leakage is present in the starter rotary slide valve.

C. Idle System

The idle system of the carburetor consists of the idle fuel jet, the idle air jet and the idle mixture adjustment screw.

a) Idle – Phase 1

The fuel which is drawn in via the idle fuel jet (14) is mixed with the air from the idle air jet (13), forming a mixture which passes into the idle canal (40). In the idle position a further supply of air for the idle mixture enters through the by-pass bores (42) above the throttle valve and then passes into the suction canal through the idle mixture bore (41) and combines with the air streaming through the throttle valve gap to form the final idle mixture (Fig. 07-0/7).

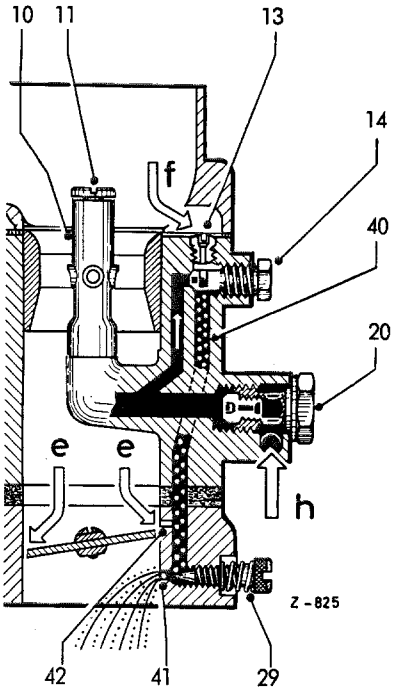


Fig. 07-0/7

Idle — Phase 1

e) Main air supply
f) Entry of idle air
h) Fuel feed

10 Mixing tube holder with mixing tube
11 Air correction jet
13 Idle air jet
14 Idle fuel jet
20 Main jet plug with main jet
29 Idle mixture adjustment screw
40 Idle canal
41 Idle mixture bore
42 By-pass bores

The cross-section of the idle mixture bore (41) can be varied by moving the idle mixture adjustment screw (29). When the idle mixture adjustment screw is slackened, the mixture is enriched.

The idle speed is adjusted by means of the idle adjustment screw on the throttle valve lever (see Job No. 01-3, Section K).

b) Idle – Phase 2

When the throttle valve is being slightly opened, idle mixture flows through both the idle mixture bore (41) and the by-pass bores (42). The by-pass bores now serve to ensure a proper changeover to the main carburetion system (Figs. 07-0/7 and 07-0/8).

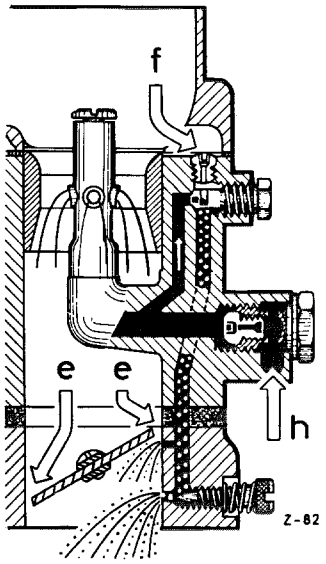


Fig. 07-0/8

Idle — Phase 2
(Throttle valve slightly open)

e) Main air supply
f) Entry of idle air
h) Fuel feed

Note: a) In the suction canal of the carburetor at the same height as the by-pass bores, but offset to one side there is a further bore which leads to a threaded union in the carburetor housing and takes the distributor vacuum line.

b) The carburetor for Model 180 a as from Engine End No. 8506159 has a bore on the carburetor flange which serves as a connection for a vacuum test gage and which is closed with a grub screw.

D. Main Carburetion System

In its standard form the downdraft carburetor Type 32 PJCB has a float chamber with float and float needle valve in the carburetor cover. The float chamber is ventilated by the tube (9) in the carburetor cover. The carburetor parts for the main carburetion system are the air horn, the main jet and the air correction jet with mixing tube (see Fig. 07-0/1).

From the float chamber the fuel flows via the main jet screwed into the main jet plug (20) into the mixing tube holder (10). If the throttle valve is opened still further, that is beyond the idle position phase 2, the partial vacuum which has moved further upward causes fuel to be drawn through the outlet bores of the mixing tube holder and this fuel is mixed with the air entering through the air intake branch in the carburetor cover.

When the fuel level in the mixing tube holder decreases as a result of the increasing partial vacuum, i. e. at higher engine speed, compensating air enters through the air correction jet (11) which, through the small bores in the mixing tube mixes with the fuel flowing through the main jet. With increasing engine speed the proportion of air in the mixture increases so that overenrichment of the fuel-air mixture is prevented and an almost uniform proportion of fuel to air is ensured over the whole speed range (Figs. 07-0/7 and 07-0/9).

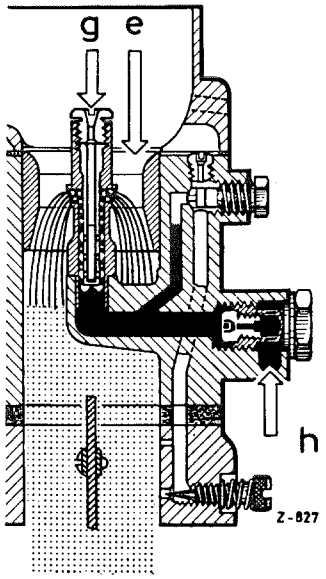


Fig. 07-0/9

Main carburetion system
(Throttle valve in full-load position)

e) Main air supply
g) Entry of compensating air
h) Fuel feed

E. Accelerating Pump

The accelerating pump No. 73 is a so-called "mixture enriching" pump which means that in the upper load range the fuel-air mixture is enriched via the pump system. In contrast to the "neutral" pumps this "mixture enriching" pump has a ball valve (17) which permits an enrichment of the fuel-air mixture only in the upper load range of the engine. The ball valve is actuated by the pump diaphragm via the throttle valve shaft, the connecting rod and the pump arm. In the upper load range the tip of the diaphragm pin (19) keeps the ball valve (17) open. In relation to the degree of vacuum obtaining in the air horn, additional fuel is drawn in from the pump system via injection tube (15) when the ball valve is open, and the fuel-air mixture is thus enriched.

The enrichment delivery point varies with the individual carburetor types (see Section F).

The main purpose of the accelerating pump, however, is to spray extra fuel into the mixing chamber of the suction canal when the accelerator pedal is depressed, in order to achieve a smooth speed build-up and good acceleration.

Pump arm (31) of the accelerating pump is connected with the throttle valve shaft by means of connecting rod (30). With the throttle valve closed, diaphragm (19) is pushed outward by the diaphragm spring (18). Since the pump chamber is connected with the float chamber by way of ball valve (21), it is filled with fuel.

When operating the accelerator pedal connecting rod (30) will move pump arm (31). The pump arm will then push the diaphragm inwards so that the fuel in front of the diaphragm is injected by way of ball valve (17), pump jet (16), the ball valve in the injection tube holder (15) and finally the injection tube itself.

During the injection, ball valve (21), which operates as a check valve is closed. When the accelerator pedal moves back, diaphragm spring (18) will push diaphragm (19) back. Now, ball valve (21) operates as a through-way valve while the ball valve in the injection tube holder (15) operates as a check valve and prevents the penetration of air from the carburetor suction canal into the pump system (Fig. 07–0/10).

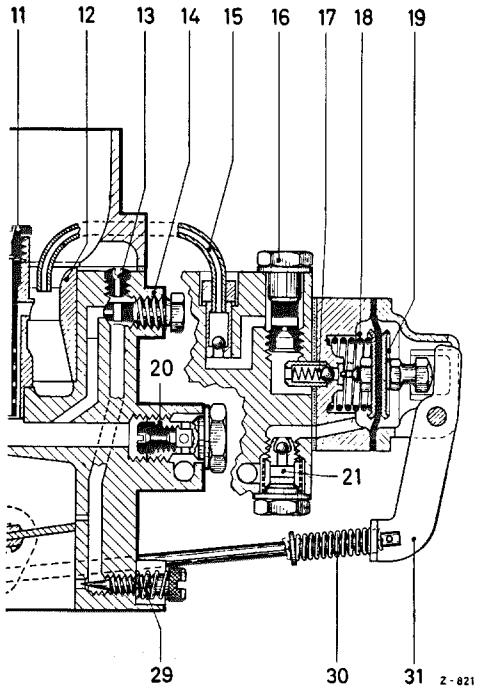


Fig. 07–0/10

11 Air correction jet
12 Air horn
13 Idle air jet
14 Idle fuel jet
15 Injection tube
16 Pump jet
17 Ball valve
18 Diaphragm spring
19 Pump diaphragm
20 Main jet plug with main jet
21 Ball valve
29 Idle mixture adjustment screw
30 Connecting rod
31 Pump arm

The injection amount for the carburetor of Model 180 should be 0.7–1.0 cc/stroke, and for the carburetor of Model 180 a 0.9–1.2 cc/stroke. The addition of shims between the pump arm and the cotter pin in the connecting rod will change the injection amount within narrow limits only, because this will simultaneously change the enrichment delivery point of the fuel/air mixture via the pump system. Replace pump diaphragm, if required. However, a test should be made previously as to whether the connecting rod and the pump arm moves without obstructions. In addition, the position of the cotter pins in the connecting rod should be checked. (Refer to Note of Section F). Following the installation of a new diaphragm or the adjustment of the injection amount the enrichment delivery point should be checked (refer to Job No. 01–3, Section H).

F. Technical Specifications of Solex Downdraft Carburetor Type 32 PJCB

Carburetor			Model 180	Model 180a
Air horn "K"			25	26
Main jet "Gg"			0125	0150
Air correction jet "a"			200	205
Mixing tube "s"			10	1
Mixing tube holder (reserve)			5.5	5.3
Idle fuel jet "g"			55	50
Idle air jet "u"			1.5	1.5
Acceleration pump			No. 73 (enriching)	
Injection amount cc/stroke			0.7–1.0	0.9–1.2
Pump jet "Gp"			50	60
Injection tube			low (not graded)	high (0.5 graded)
Beginning of mixture enrichment via pump system			Throttle valve angle 27°–33°	36°–40°
Pump diaphragm	Bolt length	mm	$21.0^{+0.75}_{-0.3}$	20.5 ± 0.1
	Plate dia	mm	22	
Starter fuel jet "Gs"			180	
Starter air bore in rotary slide valve of starter, mm ⌀			5.5	
Float needle valve			1.5	2.0
Float weight (Float of nylon) g			5.7	
Fuel level mm			16–20	
Angle of inclination of throttle flap			8°	
Bore in throttle valve, mm ⌀			—	2.5
By-pass bores, mm ⌀			1.1/1.1	1.2/1.0

Note: Carburetor for Models 180 and 180 a

a) The length of the pump diaphragm bolt is measured from the dome against which the pump arm rests to the tip of the pin actuating the ball valve in the accelerating pump (Fig. 07–0/10 a).

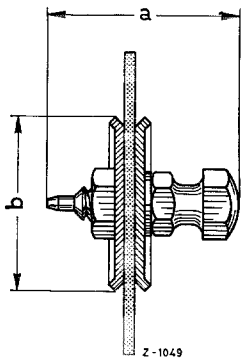


Fig. 07–0/10 a

a) Bolt length
b) Plate diameter

b) Position of cotter pins in connecting rod.

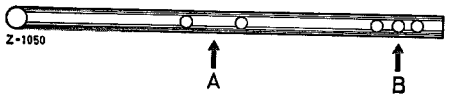


Fig. 07–0/10 b

A Cotter pin at pressure spring
B Cotter pin at pump arm

	Pump diaphragm installed			
	Bolt length 21 mm Diaphragm plate ⌀ 22 mm	Bolt length 19.0 mm Diaphragm plate ⌀ 16 mm	Bolt length 20.5 mm Diaphragm plate ⌀ 16 mm	Bolt length 20.5 mm Diaphragm plate ⌀ 22 mm
Cotter pin A	left cotter-pin hole	right cotter-pin hole	left cotter-pin hole	
Cotter pin B	center cotter-pin hole			
Shim between pump arm and cotter pin B	—		1 mm	—

c) The injection amount of the accelerating pump is measured with the throttle valve in the **idle position,** whereas the enrichment delivery point is checked with the throttle valve **completely closed.**

Carburetor for Model 180 a

d) Up to Engine End No. 85 14427 the carburetor was equipped with a mixing tube holder (reserve) 5.5 and an air correction jet "a" 230.

As from Engine End No. 8514428 a mixing tube holder (reserve) 5.3 and an air correction jet "a" 220 have been installed.

e) Up to Engine End No. 8515851 the carburetor was equipped with an air correction jet "a" 220 (see "d" as from Engine End No. 8514428), a pump jet "Gp" 70, an injection tube "low" (0.5 graded) and a pump diaphragm with a bolt length of 19.0 ± 0.1 mm and a plate diameter of 16 mm. In the case of carburetors with this type of pump diaphragm the enrichment begins at a throttle valve angle of 55°–60°. As from Engine End No. 8515852 an air correction jet "a" 210, a pump jet "Gp" 60, an injection tube "high" and a pump diaphragm with a bolt length of 20.5 ± 0.1 mm have been installed (enrichment delivery point at 40°–44° throttle valve angle).

f) From Engine End No. 8515852 to Engine End No. 8516090 the carburetor was equipped with an air correction jet "a" 210. As from Engine End No. 8516091 an air correction jet "a" 205 has been installed.

g) As from Engine End No. 9504458 (as from Carburetor No. 1398 489) the plate of the pump diaphragm has been enlarged from 16 mm diameter to 22 mm diameter and the enrichment delivery point has been changed from 40°–44° to 36°–40° throttle valve angle.

h) If complaints are received about jerky running of the car under partial load or about uneven speed build-up, the carburetor can be modernized subsequently provided, however, that it has a mixing tube holder (reserve) 5.3. The mixing tube holder should only be replaced under very special circumstances and only by an experienced mechanic. A suitable sleeve, together with a stud bolt M 6, a hexagon nut and a washer should be used to press off the mixing tube holder. When fitting the new mixing tube holder make sure that it is properly seated and fits tightly in the carburetor housing. When installing a new pump diaphragm, check the injection amount of the accelerating pump and the enrichment delivery point (see Job No. 01–3, Section H).

i) The mixing tube holder (reserve) 5.3 (installed as a standard part as from Engine End No. 8514428) is marked with the number 5.3 stamped in the side.

Carburetor for Model 180

k) Up to Engine End No. 3504026 a brass float weighing 12.5 g was fitted. A nylon float has been installed as a standard part as from Engine End No. 3504027.