DESCRIPTION OF THE DUAL DOWNDRAFT CARBURETOR ZENITH 32 NDIX

General

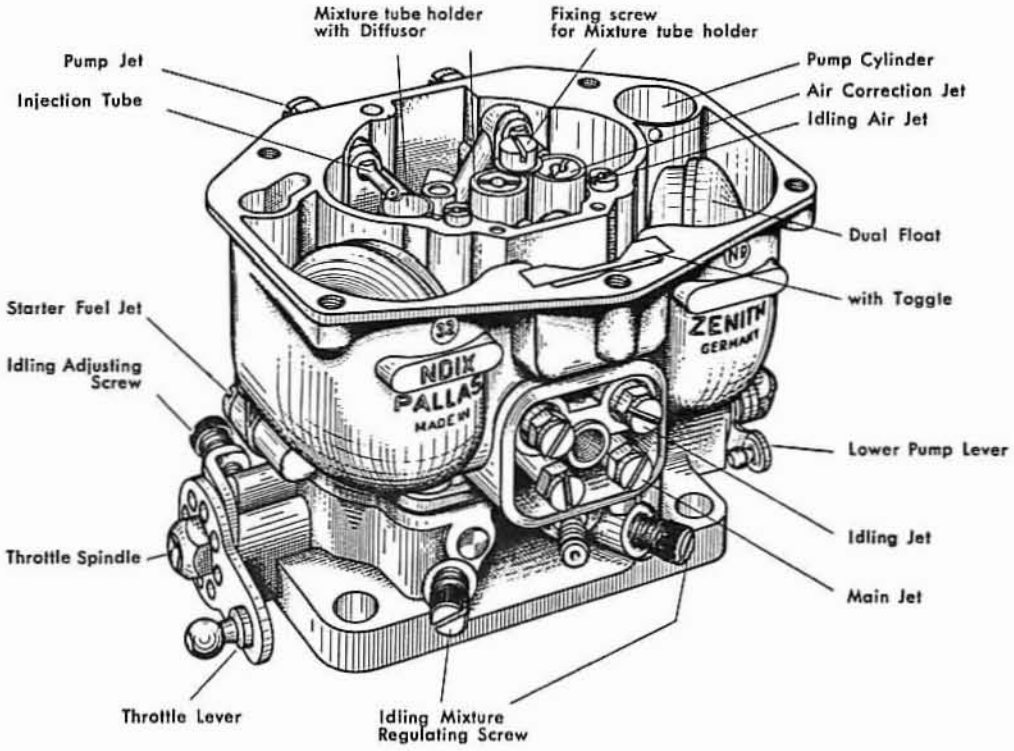
The Dual Downdraft Carburetor Zenith 32 NDIX has two barrels with a 32 mm (1.17") intake. It is provided with a central air intake and is water- and dust-proof.

Description

The carburetor consists of three main components: Throttle butterfly valve assembly, float chamber and carburetor cover.

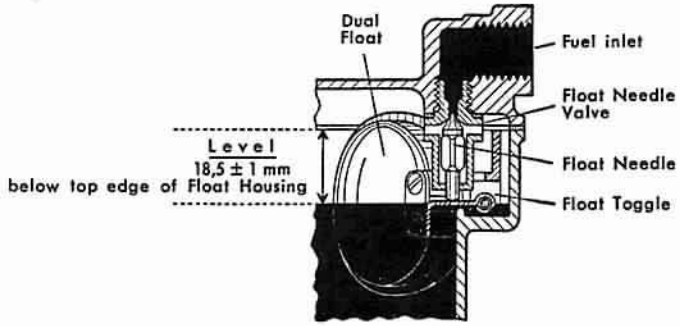
The cast iron **throttle assembly** is attached with its flange to the intake manifold of the engine. Above the flange across the two barrels is the **throttle shaft** with the two **throttle butterfly valves.** Attached to the ends of the throttle shaft are the throttle lever, a throttle stop and the lower pump lever. The **throttle lever** allows to control the position of the butterfly valves and thus the quantity of the intake fuel air mixture. The **idling adjusting screw** is mounted on the **throttle stop.** The lower **pump lever** actuates the **pump rod** for the accelerator pump. On the throttle assembly there are also two **idling mixture regulating screws** and an assembly screw for the depression responsive timing gear.

The die-cast **carburetor main body** connects the two mixing chambers and the dual float chamber. It contains all parts necessary for the preparation of the fuel air mixture for normal operation and idling, the float assembly and the accelerator pump. The starting device is fitted to it. The main body and the throttle body are bolted on the carburetor housing with the aid of a gasket and need normally not be removed.



Zenith Carburetor Type NDIX — Cover removed Fig. 1

The **Carburetor cover** — also of die-cast — is mounted on the float chamber with the aid of a gasket and may be removed after loosening the five retaining screws to give access to the inside of the carburetor. It is connected to the fuel pipe. The **float needle valve** controling the fuel supply is screwed to the inside of the carburetor cover. Inside the air intake of the carburetor cover, the vent tube for the float chamber and for the entry of the compensating air for the starting device are found. The air filter is also fitted to the carburetor cover.



Float system Fig. 2

The **float system** consists of the **dual plastic float** and the float toggle. The float system maintains a constant fuel level in the carburetor. When the fuel has reached the required level, the rising float forces the needle valve on to its seat and shuts off the fuel supply. The dual float chamber and the floats provide the correct quantity of fuel even at oblique angles of the vehicle („cross-country" carburetor).

The carburetor is provided with a **central air intake** and is therefore water- and dustproof. The air filter fitted to the carburetor cleans the air needed for the mixture at all engine operation conditions (starting, idling, normal operation) as well as for ventilating the float chamber. Internal ventilation of the float chamber not only prevents particles of dirt getting into the carburetor, but it also enables the carburetor to deliver a constant fuel air mixture even if the air filter is clogged, with the result that the fuel consumption is not affected no matter how badly the filter may be clogged.

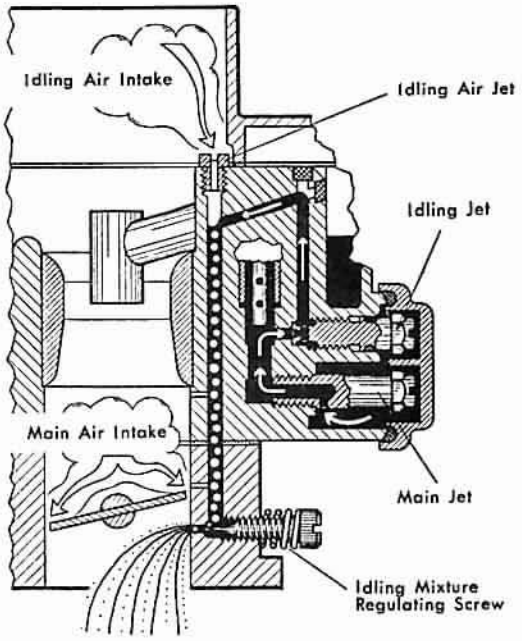
Idling Circuit

Each barrel of the carburetor is provided with an idling circuit (see Fig. 3 and 4) which also acts as a small auxiliary carburetor. The idling mixture is determined by:

- the **idling jet** which meters the quantity of fuel, and
- the **idling air jet** which regulates the proportion of air, and
- the **idling mixture regulating screw** which reduces or increases the quantity of idling mixture drawn in.

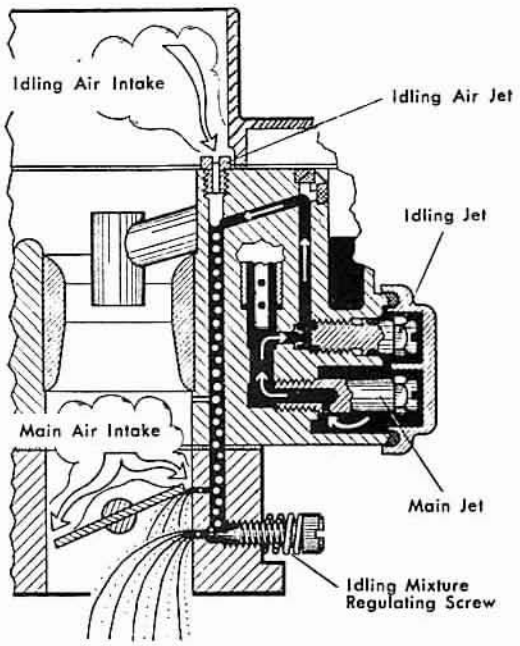
The fuel required for the idling is taken from the mixture tube holder after having passed the main jet. It is drawn to a point above the fuel level by the idling jet and mixed with the air entering through the idling air jet to form a mixture.

The idling mixture flows downwards to an orifice leading into the mixing chamber somewhat below the throttle valve. The aperture can be altered by the mixture regulating screw. At idling speed of the engine the idling mixture is discharged through this orifice into the mixing chamber and then mixed with the air entering through the throttle butterfly opening.



Operation at Idling Speed Fig. 3

Just above the throttle valve there are two further orifices subjected to the depression. When the throttle valve is opened they also deliver idling mixture, thereby causing flawless transition from idling to main jet circuit.



Operation during Transit Fig. 4

With the aid of the **idling mixture regulating screw** the quantity of fuel in the idling mixture can be increased or reduced. Adjustment of this screw reduces or increases the quantity of the idling mixture drawn in. Screwing it in provides an idling mixture with a low fuel content and by unscrewing it a richer fuel air mixture is admitted.

The **idling adjustment screw** which is attached to a stop on the throttle shaft can be used to regulate the idling speed of the engine by increasing or reducing the throttle valve opening. The idling speed is increased by screwing it in and is reduced by unscrewing it.

The main carburation takes place in the two mixing chambers (Fig. 5).

Each mixing chamber is provided with a **venturi** and in front of it is a diffusor which is combined with the **mixture tube holder.** The two mixture tube holders are secured by one common fixing screw in the float chamber. In each mixture tube holder there is a **mixture tube** which is clamped by the screwed-on **air correction jet.**

The two **main jets** and the two idling jets are situated under a cover-plate at the side of the carburetor. The cover is mounted with the aid of a gasket as the chamber covered by it is in connection with the float chamber and filled with fuel.

For normal operation the fuel air mixture in the main carburetor is determined by:

the **main jet** which meters the quantity of fuel,

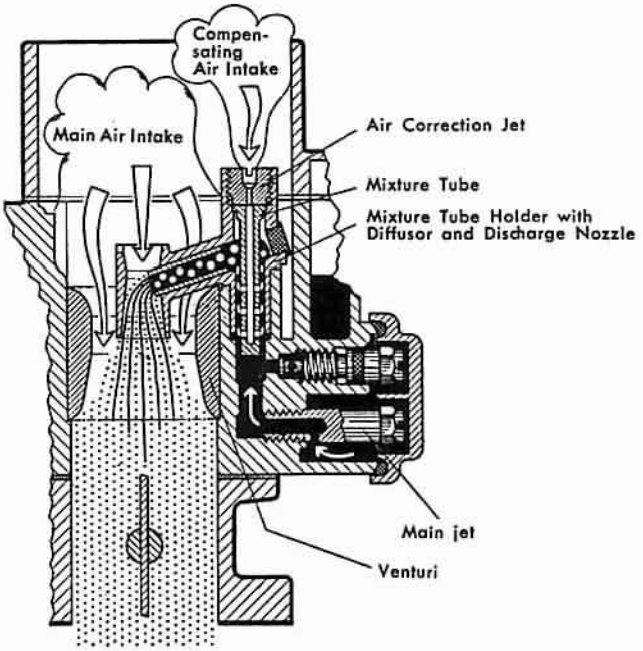
the **air correction jet** which meters correctional air as the engine speed increases, and

the **venturi** which controls the air volume.

The fuel flows from the float chamber into the space under the cover. From here it flows through the calibrated orifice of the two main jets into the main jet holders filling them to the general level of the fuel.

As the throttle valves are opened a vacuum is formed in the mixing chambers, which is greatest in the venturi. This vacuum acts on the main jet system and draws fuel from the outlet orifices of the main jet assembly. First the fuel is mixed in the small diffusors with the incoming air and then in the large venturis with the air entering there, and thus the fuel air mixture is formed.

As the vacuum increases the fuel level in the main jet holder decreases and compensating air enters through the air correction jets which mixes via the small orifices in the mixture tubes



Operation at Full Throttle Fig. 5

with the fuel from the main jets. With increasing speed more compensating air is drawn in, preventing the otherwise occuring enrichening of the fuel-air mixture and ensuring its approximately equal composition throughout the entire range of engine operation.

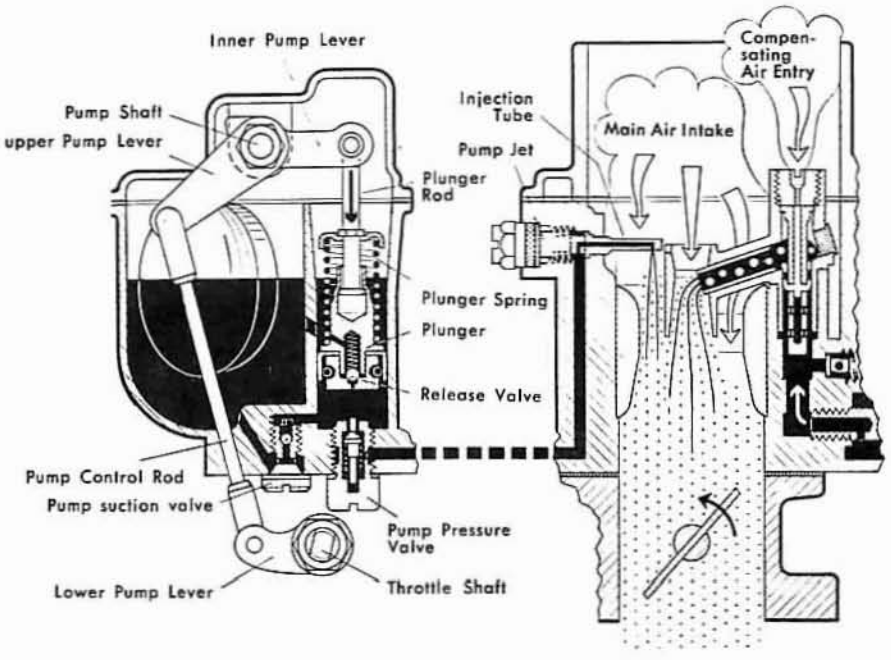
Accelerator Pump

The **accelerator pump** of the carburetor (Fig. 6) is of the plunger type. A partioned space of the float chamber forms the pump cylinder in which the **plunger** performs its up and down movement. The plunger is attached to the **pump lever** seated on the **pump shaft** in the carburetor cover. The **throttle valve** shaft and the **pump shaft** are connected through a linkage — consisting of lower and upper **pump lever** and the **pump rod.**

As the throttle valves are closed the pump plunger moves in an upward direction and fuel is drawn through the **pump suction valve** into the **pump cylinder.** The foregoing is termed the suction stroke of the accelerator pump.

When the throttle valves are opened the plunger moves downwards and the pressure stroke of the pump is effected. The fuel is forced into the mixing chambers of the carburetor through the pump pressure valve and pump jet with injection tubes.

The plunger is provided with a damping device which enters into operation when a sudden actuation takes place. Then the pressure of the plunger is built up as a resilient force and according to the flow of fuel the plunger moves downwards. The plunger is also provided with a release valve which returns the fuel when it is required to reduce the output of the pump.



Operation of accelerator pump Fig. 6

Efficient acceleration is thus obtained by supplementing the main fuel air mixture. An alteration of the pump jet only alters the duration of the injection, because the calibration of these jets establishes the rate of flow in relation to a unit of time.

Part Throttle and Full Throttle Control

Part throttle and full throttle control is an effective means of favourably balancing output and consumption and thus of keeping down operation costs. An additional function of the plunger type pump is based on the fact that an additional circuit is provided through the pump and the injector tube for the delivery of the fuel into the mixing chambers (the normal path is via the main jet and the mixture tube holders).

The amount of fuel delivered depends on the vacuum existing in the mixing chamber above the venturi and on the pump jet. If the plunger is in its lowest position it presses against a protuding boss of the pump pressure valve, keeping it permanently open. The increasing suction on the injection tube draws additional fuel through the pump circuit to meet the additional needs of the engine.

Please note that this additional fuel is merely supplied when the throttle butterfly valves are fully open and at high speeds, i. e. if the pump valve remains closed because the plunger does not reach the boss. If the accelerator pedal is depressed at low speed, the pump pressure valve is open, but the delivery of fuel from the pump system does not commence as the vacuum is not sufficient to draw additional fuel.

This device considerably contributes to economical operation as the engine can be ajdusted in the part load range to decrease operation cost.

① Main jets

② Idling jets

③ Air correction jets

④ Idling air jets

⑤ Injection tube-pump jets

⑥ Dual float

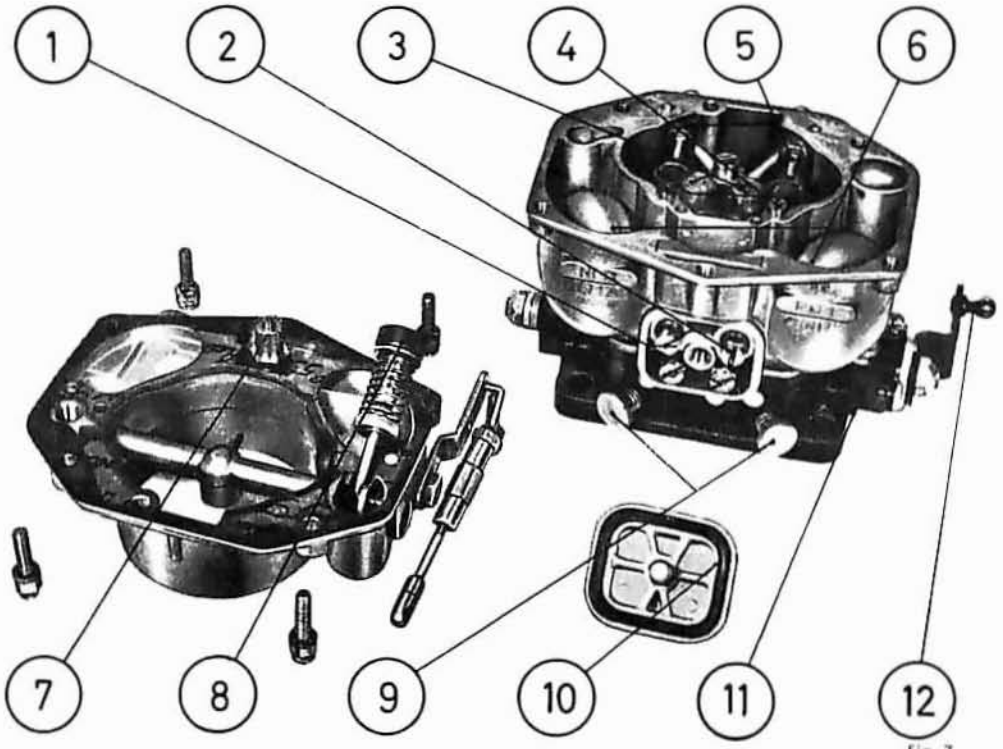


Fig. 7

⑦ Float needle valve

⑧ Pump plunger (accelerator pump)

⑨ Idling mixture regulating screw

⑩ Jet chamber cover

⑪ Idling adjustment screw

⑫ Carburetor lever

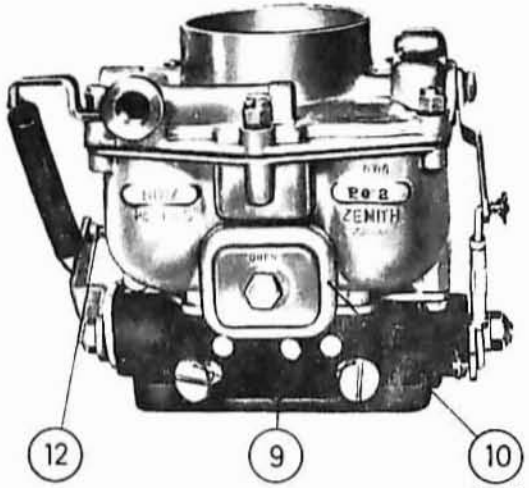
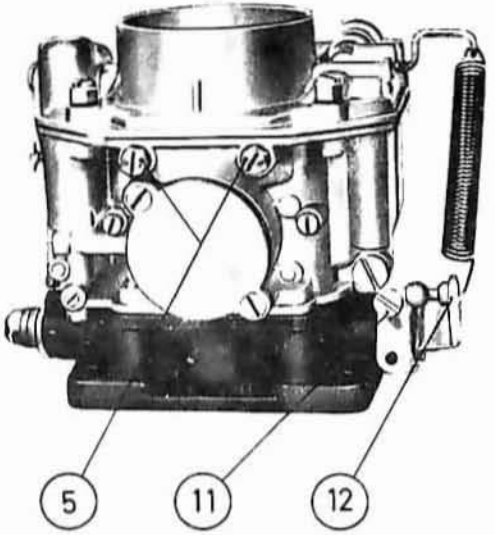


Fig. 8

Dual Downdraft Carburetor

Zenith 32 NDIX



CARBURETOR ADJUSTMENT DATA

Engine Type	1600 (616/1)	1600 S (616/2)	Remarks
Carburetor Zenith	32 NDIX	32 NDIX	2 per engine
Characteristics	dependent idling	dependent idling	——
Venturi K	24	28	2 per carburetor
Main Jet Gg	0115	0130	2 per carburetor
Air correction Jet a	230	220	2 per carburetor
Idling jet g	50	50	2 per carburetor
Idling air jet u	120	140	2 per carburetor
Pump jet Gp	50	40	2 per carburetor
Injection tube	No. 8 short	No. 8 short	2 per carburetor
Float needle valve	125	125	1 per carburetor
Float weight	per float 5,2 g	per float 5,2 g	2 per carburetor
Mixture tube	No. 1 S	No. 1 S	2 per carburetor
By-pass bore	1,4/1,4	1,4/1,4	——
Injection quantity	0,2—0,3 cu. cm at 2 strokes per tube	0,2—0,3 cu. cm at 2 strokes per tube	2 tubes per carburetor
Float level	18,5 ± 1,0 mm .728" ± .04"	18,5 ± 1,0 mm .728" ± .04"	measured with cover closed and a pressure of 1,8 m water column

Special importance attaches to the main jet in regard to differences in altitude. A good rule of thumb regulation to go by is: for every 3300 ft (1000 metres) difference in altitude, the cross section of the main jet must be changed approx. 6 %. (Example: normal adjustment at 1310 ft [400 metres] above sealevel is 0110; adjustment at 4590 ft [1400 metres] above sealevel is 0105).

Removing and Installing Carburetor

Special tools:
P 23 Carburetor wrench 12 mm
P 75 Carburetor Synchronizing unit

Removal

1. Close fuel cock
2. Remove air filter
3. Disconnect fuel line between fuel pump and carburetor

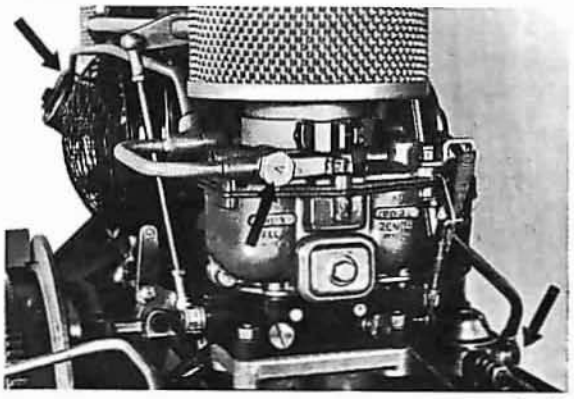


Fig. 10

4. Loosen and remove carburetor throttle lever

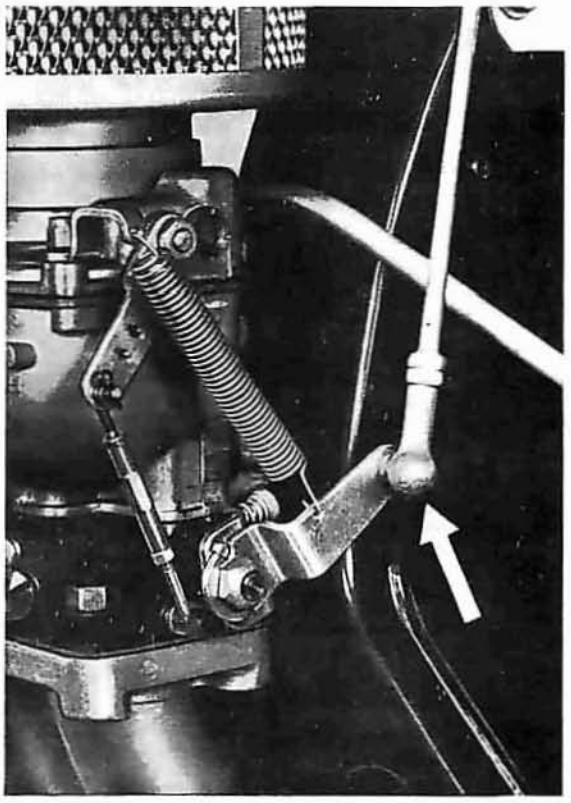


Fig. 11

5. Loosen carburetor flange nuts (special wrench P 23)

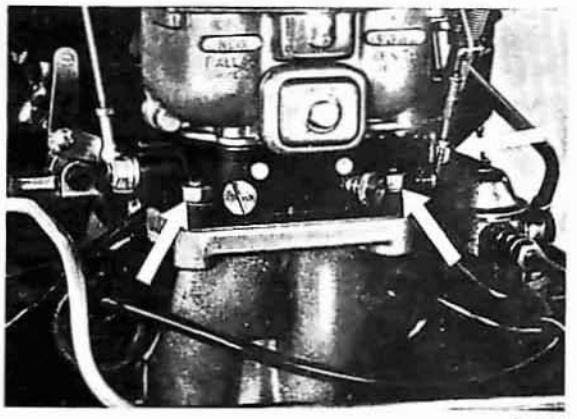


Fig. 12

6. Take off carburetor
7. Cover intake manifold

Installation

When installing proceed in reverse order, observing the following points:

1. Replace gasket at intake manifold flange
2. Tighten carburetor flange nuts
3. Adjust throttle valve position by actuating accelerator linkage so that at full throttle opening both carburetors are in the same open position
4. Check gasket for fuel line nipple, replace if necessary
5. If necessary clean and oil filter
6. Adjust idling speed. Synchronize carburetors using P 75 unit

Cleaning of the Carburetor

Cleaning

1. Remove carburetor
2. Wash carburetor in clean gasoline (petrol)
3. Pull out safety spring at pump lever and unhook pump linkage
4. Loosen retaining screw on carburetor cover
5. Take off carburetor cover
6. Remove dual float
7. Remove cover (jet chamber cover), unscrew main jets and idling jets
8. Unscrew retaining screw for mixture tube holder, loosen air correction jets, take off both mixture tube holders, remove air correction jets, remove and clean mixture tubes
9. Remove and clean idling air jet
10. Remove and clean float needle valve and pump jets
11. Carefully clean all jets and lines
12. Reinsert jets
    It is recommended to clean the carburetor in clean gasoline (petrol). Blow compressed air through jets and lines. When cleaning the jets do not use wire, since this will damage or widen the gauged bores.

Disassembling and Assembling Carburetor

1. Remove carburetor
2. Remove spring clip and pressure spring at pump linkage and unhook linkage

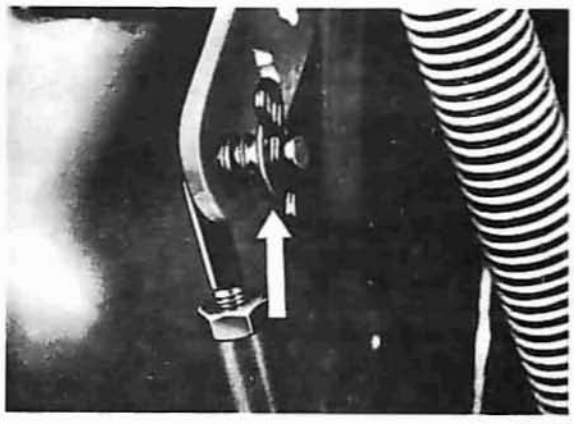


Fig. 13

3. Loosen retaining screws and carefully take off carburetor
4. Remove float toggle lever and take off dual float

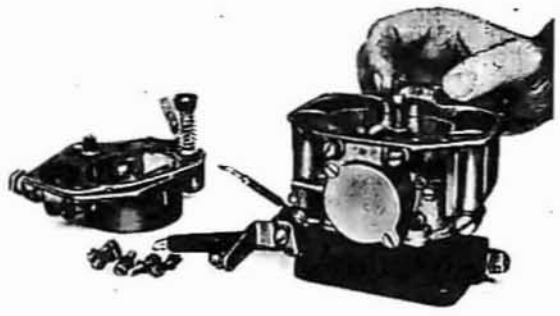


Fig. 14

5. Remove retaining screw on mixture tube holder

6. Loosen air correction jets

7. Pull out mixture tube holder

8. Screw out air correction jets and remove both mixture tubes

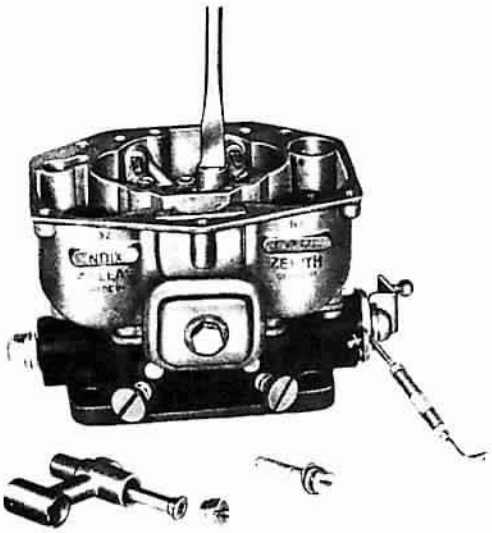


Fig. 15

9. Screw out idling air jets

10. Screw out pump jets

11. Remove injection tubes, if necessary by using a screw driver which should be protected by means of a protection tube to avoid damage to the injection tubes. Protect venturi by a piece of wood as illustrated below (Fig. 16)

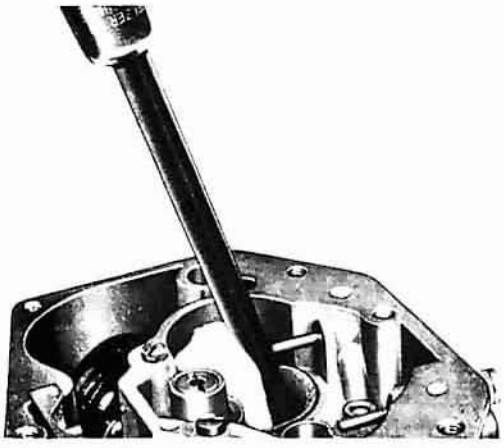


Fig. 16

12. Release venturi clamping screw and lift out venturi

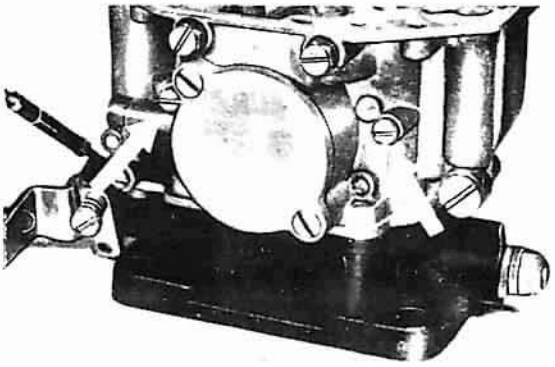


Fig. 17

13. Remove jet chamber cover

14. Remove main jets and idling jets

15. Remove idling mixture regulating screws

Cleaning

1. Clean all components in fuel

2. Blow compressed air through jets, valves, and lines. When cleaning do not use wire, since this will damage or widen the gauged bores

Inspection and Assembly

When assembling proceed in reverse order of disassembling. To check the components the following points should be observed:

Carburetor Cover

1. Check float needle valve for leaks

2. The sealing surface of the float needle valve must be perfectly smooth and clean

3. Check float needle valve gasket for perfect condition and be sure that it is properly installed to prevent leakage

4. The thread for the hollow bolt must be undamaged

5. Check sealing surfaces of carburetor cover

6. Replace gaskets

The carburetor cover gasket is held by two rivets. When replacing the gasket the rivets may be removed by using a knife. The new gasket must be secured by two rivets.

Carburetor Bowl

1. Check pump plunger for perfect condition, if necessary replace

2. Check float for perfect condition, replace if leaking. For float weight see „Carburetor Adjustment Data" table, page S F 9

3. Check all jets for correct size given in the „Carburetor Adjustment Data" table

   When replacing jets or valves, only original ZENITH parts should be used which are available as spare parts. These parts are accurately calibrated and thus assure proper adjustment and low fuel consumption

4. Install venturi. Be sure that the restriction of the venturi faces upwards. Do not overtighten clamping screws (hold venturi)

5. Check clearance of throttle valve shaft. Excessive radial clearance allows secondary air to enter which has a detrimental effect on the starting and idling conditions

6. Check tip of idling mixture regulating screw for perfect condition. Replace screw if tip is bent or broken off

Idling Adjustment

Special Tool:

P 75 Carburetor Synchronizing Unit

1. Remove air filter with engine at operating temperature

2. Check that in closed position all throttle butterfly valves are fully shut and actuating linkage does not bind

3. Loosen pressure rods for actuating carburetor levers from bell cranks.

4. Tighten idling adjustment screw uniformly on both carburetors, until approx. 1.000 r.p.m. are reached

5. Fully close idling mixture regulating screws on both carburetors, reopen 1½ turns. Now adjust by screwing in or out and leave it in the position which gives the highest r.p.m. and at which the engine runs smooth. In no case may the regulating screws remain fully closed

6. Loosen idling adjustment screws until an idling speed of 650—750 r.p.m. is reached

7. Mount carburetor synchronizing unit P 75 on one carburetor and adjust by turning adjusting screw that the plunger in the inspection glass rises to about half-way position between two marks

Fig. 18

8. Mount carburetor synchronizing unit on second carburetor (varying venturi) without making any alteration at the adjusting screw until the plunger in the inspection glass is in the same position as described in point 7

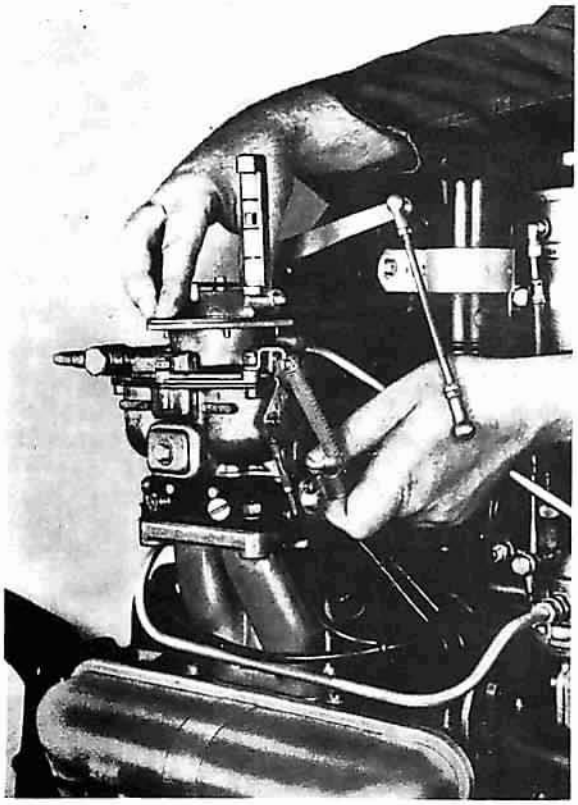


Fig. 19

9. Adjust idling mixture regulating screws of both carburetors so that the plunger in the inspection glass shows hardly any discrepancies

10. Attach pressure rods on bell cranks

Note: Adjust pressure rods that at idling position the pressure rods may be attached without tension.

11. Adjust engine speed to 1200—1300 r.p.m. by means of the hand gas knob and check uniform throttle butterfly valve position using synchronizing unit P 75 (see point 7 and 8). If the carburetor synchronizing unit does not give the same value for both carburetors the throttle valve position must be adjusted by adjusting the pressure rods

12. Again check idling speed

13. Check injection quantity

14. Check and if necessary adjust stop screw at accelerator pedal. When the accelerator pedal is fully depressed there must be a clearance of approx. .04" (1 mm) between stop point of throttle valve shaft and stop point at carburetor housing

15. Mount air filter

Adjusting Injection Ratio

Special Tool:

P 25 a Measuring glass to measure the injection quantity of the carburetor accelerator pump

Special Tools:

P 25 a Measuring glass
P 76 Carburetor wrench 5,5 mm

1. Adjust idling speed (4 Fu)
2. Fill float housing with fuel (with the engine running)
3. Stop engine and remove air filter from carburetor
4. Operate throttle lever, until bubbles on the injection tube disappear
5. Hold measuring glass (P 25 a) toward injection tube opening and press throttle lever twice from stop to stop
6. Check fuel quantity, fully empty measuring glass and repeat measuring process

7. Injection ratio should be 0,2—0,3 c.c. per injection tube at two strokes

8. Repeat measuring process on second carburetor

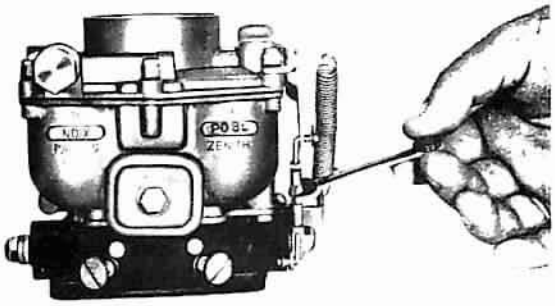


Fig. 20

Note: —
The pump jet has no influence on the injection ratio. Injection time and ratio must be uniform for both carburetors.

9. If necessary adjust the injection quantity by adjusting the pump pressure rods

The fuel jet should not impigne upon any carburetor component.

Checking Fuel Level in Float Housing

Special Tool:

P 77 Fuel Level Measuring Glass

1. Place carburetor horizontally

2. Connect level measuring glass P. 77 to fuel outlet at float housing

3. Pour fuel into float housing in the normal manner. Use a 2 m high fuel column to obtain the correct pressure

4. Close fuel supply and read fuel level. The correct level should be 18,5 ± 1,0 mm .728" ± .04" measured from the edge of carburetor housing to the fuel surface

Note:
Usually it is not necessary to adjust the fuel level provided the correct method of checking has been applied. In case an incorrect fuel level is obtained the float and float needle valve should be checked for perfect condition. Only then the fuel level may be adjusted by using a thicker or thinner gasket.

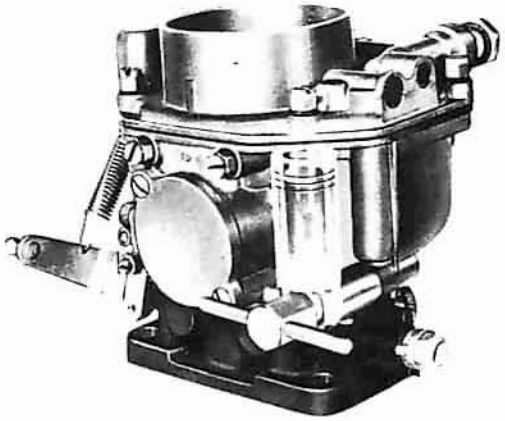


Fig. 21

Carburetor Troubles and their Cure

The below mentioned carburetor troubles presuppose the specified carburetor setting (see page F 5).

Trouble	Cause	Remedy
1. Engine will not start (with fuel in tank and ignition in order)	a) No fuel in system	a) Check in the following order: Unscrew main jet holder if fuel is coming out, the main jet is dirty. If no fuel is coming out, disconnect line to fuel pump and operate starter without switching on ignition. If fuel is coming out of the pump, the float needle valve is clogged. If no fuel is coming out it may be due to: sticking pump valves, damaged pump mechanism, or dirt in fuel cock.
	b) Carburetor flows over	b) Check and clean float needle valve Check gasket Check float, if necessary replace
2. Flat spot at idling speed	a) Idling adjustment incorrect b) Idling jet or idling air jet clogged c) Intake manifold leaking d) Idling mixture regulating screw damaged	a) Readjust idling speed b) Clean idling jet or idling air jet c) Check intake manifold, flanges, gaskets and compensation line d) Replace idling mixture regulating screw
3. Poor acceleration	a) Idling mixture too lean b) Incorrect injection ratio c) Intake manifold leaking	a) Readjust idling speed (check jet) b) Check injection ratio c) Check intake manifold, flanges and gaskets and compensation line
4. Engine stalls when accelerator pedal is suddenly released	Incorrect idling adjustment	Readjust idling speed
5. Engine runs uneven, misfires, and cuts out	a) Fuel surplus b) Lack of fuel c) Intake manifold leaking	a) Check pump pressure Check float needle valve Check float Check fuel level b) Clean main jet Check fuel lines Check fuel level c) Check intake manifold, flanges, gaskets and compensation line
6. Fuel consumption too high	a) Float needle valve flooded b) Float leaking c) Float needle valve does not close	a) Check pump pressure b) Replace float c) Check float needle valve

Cleaning Air Filter

The metal air filter, wetted with oil cleans the air. The frequency with which the air filter is cleaned depends largely on local conditions-approx. every 3000 miles (5000 km).

1. Loosen clamp screw on fastening clips and remove air filter
2. Rinse in clean gasoline (petrol)
3. Blow compressed air through filter
4. Oil air filter slightly
5. Mount air filter and tighten clamp screw

Removing and Installing Intake Manifold

Removal

1. Remove carburetor
2. Take off spark plug connectors
3. Remove vertical side duct plate
4. Loosen intake manifold nuts and screws and take off intake manifold
5. Cover suction port of cylinder head

Installation

Follow reverse order, observing the following details:

1. Replace intake manifold gasket. Care should be taken that the punched gasket holes correspond to the size of the cylinder head suction ports
2. Install graphite treated side of gasket toward cylinder head
3. Check intake manifold for cracks
4. Tighten intake manifold nuts and screws carefully and uniformly
5. Replace carburetor gasket

Removing and Installing Accelerator Linkage

Removal

1. Unhook ball pan on accelerator pedal
2. Remove accelerator pedal
3. Remove left half of floor board
4. Loosen ball pan of long accelerator rod from ball joint on bell crank
5. Unscrew ball pan and lock nut from accelerator rod, as otherwise the accelerator rod cannot be pulled backward
6. Open rear hood
7. Detach ball pan from ball joint (see Fig. 29)

Fig. 22

8. Jack up rear end of car

9. Loosen long accelerator rod from bell crank on transmission and pull it out of the frame moving backward

10. Pull out short accelerator rod from engine compartment and unhook it on bell crank

Installation

When installing proceed in reverse order. Carefully crease the ball pans and all bell crank axles. Tighten lock nuts of ball pans.

Adjusting Carburetor Linkage

The carburetor linkage must be adjusted so that all throttle valves are operated uniformly. Care must be taken that the full way of the throttle valves from idling position to full throttle opening is not obstructed by incorrect adjustment of the pressure rod at the front bell crank. Final adjustment is effected by using the carburetor synchronizing unit P 75, see page S F 14.

SPECIAL TOOLS

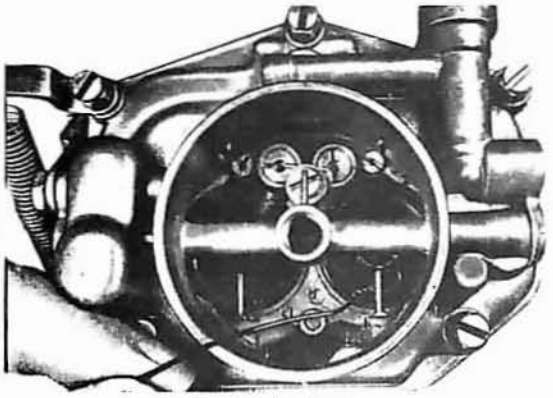
SUPPLEMENT

GROUP F

FUEL SYSTEM

Measuring Glass

P 25 a



Application

Tool

Use: For measuring injection ratio of
Downdraft Carburetors Solex 32 PBI or — 32 PBIC or — 40 PICB

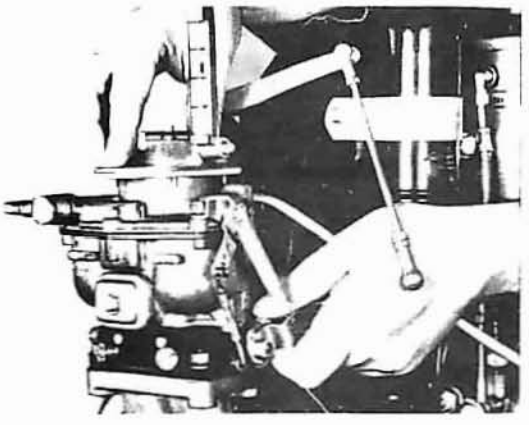
Dual Downdraft Carburetor Zenith 32 NDIX

See Service Manual Supplement Group F, Work Procedure page SF 15

Subject to Modification

Carburetor Synchronizing Unit

P 75



Application

Tool

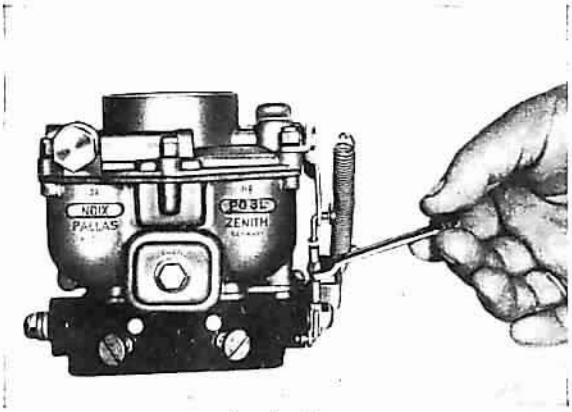
Use: For uniform adjustment of both carburetors

See Service Manual Supplement Group K, Work Procedure page SF 14

Subject to Modification

Carburetor Wrench 5 5 mm

P 76



Application

Tool

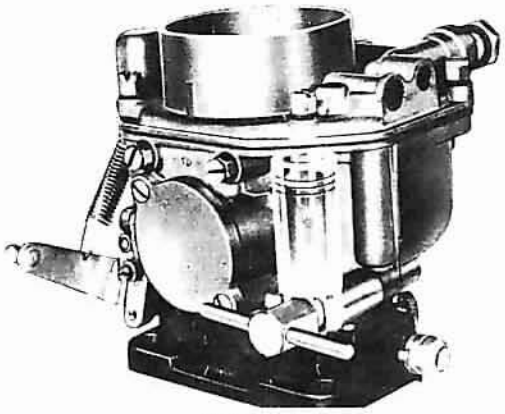
Use: For readjusting pump linkage when adjusting injection ratio
Carburetor Zenith 32 NDIX

See Service Manual Supplement Group F, Work Procedure Page SF 15

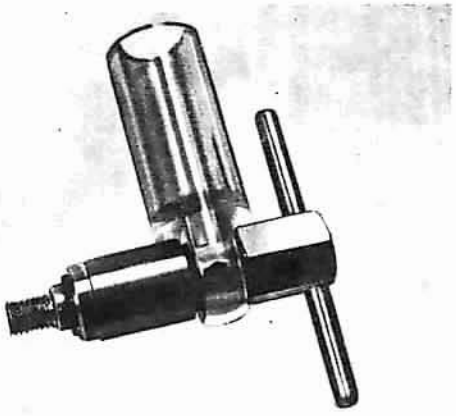
Subject to Modification

Fuel Level Measuring Glass

P 77



Application



Tool

Use: For Checking fuel level with carburetor cover closed
Carburetor Zenith 32 NDIX

See Service Manual Supplement Group F, Work Procedure page SF 16

Subject to Modification