Contents

Introduction

This publication has been compiled to provide helpful information on carburetter matters; it covers all AUTO UNION vehicles.

Each vehicle model in our range leaves the works fitted with the best, most economical and most suitable type of carburettor.

Knowledge of the construction and working principles of the various types will be of great assistance to you when repairing, setting and checking carburetters.

The performance of the three-port two-stroke engine depends largely on the scavenging and charging cycles. Apart from the effect of the exhaust system, the intake silencer and air cleaner fitted on the inlet to the carburetter and induction system also influence engine power output. For this reason we have also included details of the air cleaner needed for each type of carburetter.

The tables of carburetter setting data provide an easy-reference guide to the optimum figures for the carburettor equipment as used on all AUTO UNION vehicles.

We trust that you will derive real pleasure and profit from reading the pages which follow.

AUTO UNION G·M·B·H
Spares and Service Division
Ingolstadt

Dates in the History of the Carburetter

The historical development of the carburetter in broad outline is as follows:

1824 First carburetter made by Samuel Morey and Erskine Hazard. In this carburetter for an atmospheric two-cylinder engine, alcohol or turpentine was warmed and the resulting vapours were passed together with air through coiled tubes.

1841 Luigi Christoforis built the first surface carburetter.

1873 Julius Hock originated a type of atomizing carburetter for petrol.

1875 Siegfried Marcus built a carburetter employing an engine-driven brush arranged to dip into petrol and fling droplets of fuel into the engine induction pipe with the aid of a scraper device.

1885 Gottlieb Daimler, Wilhelm Maybach and Karl Benz developed lightweight surface type carburetters suitable for automotive engines.

1891 Mixer valves were developed to replace carburetters.

1892 Surface carburetters were developed on the wick principle.

1893 W. Maybach developed atomizing carburetters using a method of mixture formation which pointed the way for all later carburetters.

1893 Lazar, Banki and Csonka mixed fuel with a little air prior to emergence from the jet to obtain better atomization.

1900 Krastin built the first progression jet carburetter.

1902 E. Krebs built the first atomizing carburetter with automatic bleed air control.

1906 Francois Baverey originated the trend-setting compensator jet carburetter.

1910 Charles Henri Claudel developed the emulsion jet carburetter.

The function of the carburetter is to generate an ignitable fuel/air mixture.

The principal carburetter units are as follows:

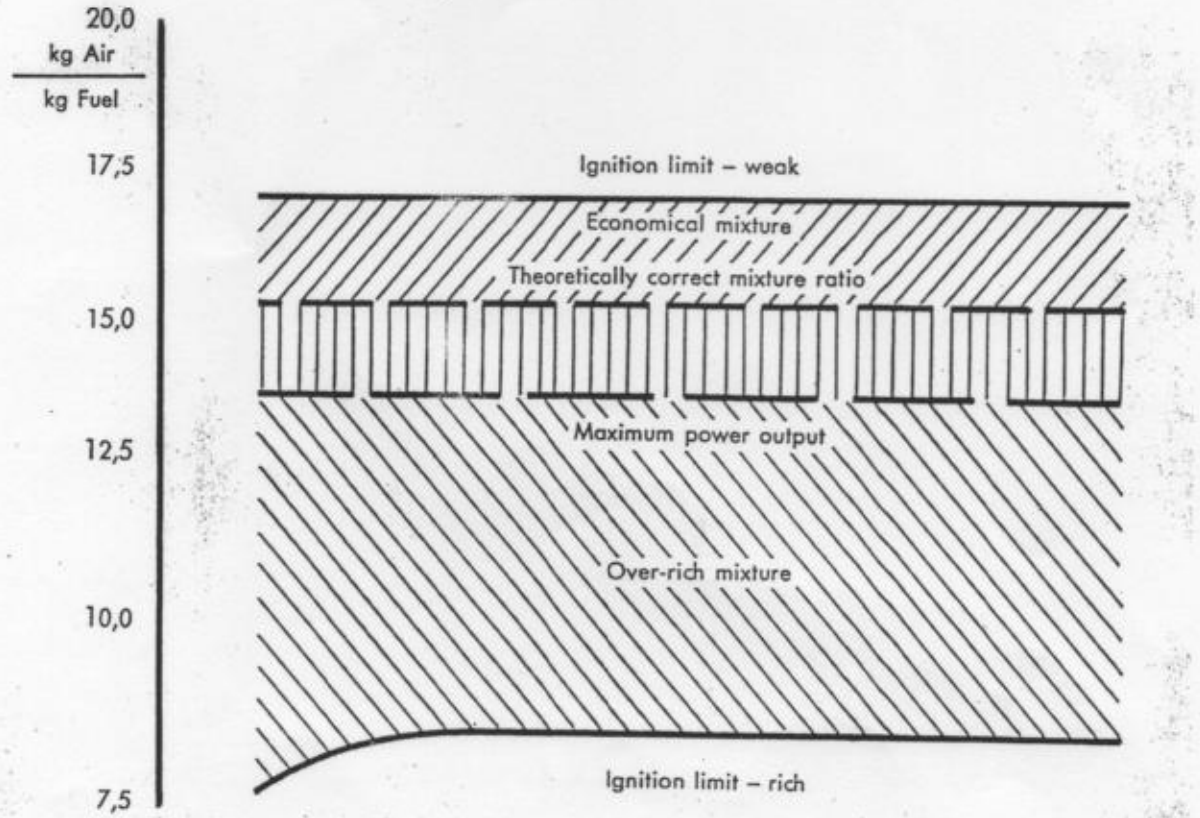
① Float assembly
② Air cleaner and air jets
③ Main jet system
④ Starter assembly
⑤ Idling assembly

A petroil mixture in a 40:1 ratio (25:1 on earlier types) provides the energy for driving the AUTO UNION two-stroke engine.

Specific gravity	6.15 lb./gal. U.S.	7.4 lb./gal. Imp. (0.740 kg/litre)
Heat of combustion	19800 B.Th.U./lb.	(11000 kcal/kg)
Net calorific value	18700 B.Th.U./lb.	(10400 kcal/kg)
Calorific value/gal.	115500 B.Th.U./gal. U.S. or 500 B.Th.U./cu. in.	138000 B.Th.U./gal. Imp. (7700 kcal/litre)

The power output of the engine depends on the quantity of heat supplied to it by the fuel/air mixture (flow-controlled).

The fuel/air mixture is only ignitable within very narrow limits, as shown in the diagram below. On average, the ignition limit lies at a level equivalent to about 4% fuel to 100 parts fuel/air mixture.



Properties of Fuel/Air Mixture in Relation to Mixture Ratio

The complete combustion of 1 lb. (1 kg) of fuel requires, in theory, about 15 lb. (15 kg) of air. With about 10% excess of air (weak carburetter setting) maximum economy is obtained, whilst with approximately 10% deficiency of air (rich carburetter setting) maximum power output is yielded.

Outside these limits, engine performance falls off to a marked extent. Conversion of the fuel into a readily ignitable fuel/air mixture makes very exacting demands on carburetter design.

The actual vaporization of the fuel (that is to say its conversion from the liquid to the gaseous state of aggregation) does not take place in the carburetter itself, but in the engine under the action of heat and pressure.

This explains why the fuel atomizes less efficiently when the engine is cold.

Carburetter fuels are compounds of carbon and hydrogen which require oxygen for their combustion (air consists of about 21 % oxygen and about 79% nitrogen). Under conditions of complete combustion, carbon dioxide is formed. Shortage of oxygen results in incomplete combustion and the formation of poisonous carbon monoxide gas. A cold engine, low r.p.m., incorrectly adjusted carburetter or a dirty air cleaner can give rise to similar effects.

To burn 1 gallon of fuel at optimum efficiency about 8500 gallons (8500 litres) of air are needed, assuming that the engine is at normal working temperature.

The mixture constitution obtained at a given, constant carburetter setting is found to vary with climate (atmospheric humidity), altitude (density of air) and air temperature; it also depends on engine temperature.

When an engine is started from cold, the fuel condenses and deposits in the induction manifold and crankcase and on the cold cylinder walls. The fuel/air mixture is thereby weakened and ignites very unwillingly. For cold starting purposes, therefore, a very rich mixture must be provided (cold starting assembly).

When starting with the engine hot, the exact opposite applies. The heat radiating from the engine while it is stopped causes evaporation of the fuel. The resulting fuel vapour fills the space above the throttle butterfly; operation of the accelerator pedal during starting causes the throttle butterfly to open and admits this very rich mixture to the engine. A mixture of this kind is very difficult to ignite. To overcome this difficulty a hot starting attachment is needed.

When a certain period has elapsed after starting, the engine should run under idling conditions (idling assembly).

All of these requirements, which are satisfied in the main by the carburetters fitted by AUTO UNION, call for optimum carburetter setting.

Due to the operation of the two-stroke principle, the intake silencer plus air cleaner, carburetter, induction manifold, ports, cylinders, crankcase and exhaust system all act together while the engine is running to form a properly matched oscillatory system.

When carrying out repairs, therefore, it is very important to ensure that the carburetter concerned is always used with the right type of air cleaner and with the specified exhaust system, which must not be modified in any way (see information in this publication).

Venting the Float Chamber

The float chamber needs a connection to atmosphere to prevent the constantly changing fuel level from influencing the level in the main jet through positive or negative pressure effects.

The float chamber therefore communicates either with the filtered air supply (air cleaner) or with the atmosphere (vent cap). Care is necessary with "internally vented" carburettors, since the vent port may allow fuel to be drawn out of the float chamber, and this in turn leads to faulty mixture formation. One advantage of the internally vented type is, of course, that the vent port cannot become blocked by dirt. It is for this reason that the carburettors fitted to Auto Union cross-coutry vehicles, for example, have been converted from external to internal venting.

External venting, while it does not lead to faulty mixture formation, nevertheless has the drawback that the exterior of the carburetter tends to become very dirty, due to emergence of fuel.

Note

The carburetter types described in the following pages share the same basic layout and working principle. Full details of components and assemblies used in these carburettors and of the associated air cleaners and exhaust systems are given in the Tables forming the final pages of this publication.

The Solex Type 40 ICB Downdraught Carburetter

With effect from Engine No. 64 001 867, this type of carburetter is used in the following Auto Union models:

a) DKW Junior

b) F 91 cars of the Sonderklasse type; some of these, however, are still fitted with Type 40 BIC carburetters (internally vented)

c) F 93/94 cars (Big DKW)

d) AUTO UNION cars 1000 and 1000/60

e) Commercial Van 3=6

Description

(References to illustrations relate to Figs. 1 and 2)

This is a type of downdraught carburetter having a bore of 1,57 in. (40 mm); it is used on two-stroke engines in particular.

The **main body** "C" unites the **mixing chamber** and the **float chamber** and embodies all the parts necessary for forming the fuel/air mixture, as well as the **float** "F". The carburetter is attached via its flange to the induction manifold of the engine.

Above the flange is the **throttle butterfly spindle** "v" carrying the throttle butterfly "V" which is operated by the **throttle lever** "L 1" and controls the volume of the fuel/air mixture induced. Fixed to one of the sides of the carburetter body is the **starter assembly** "St".

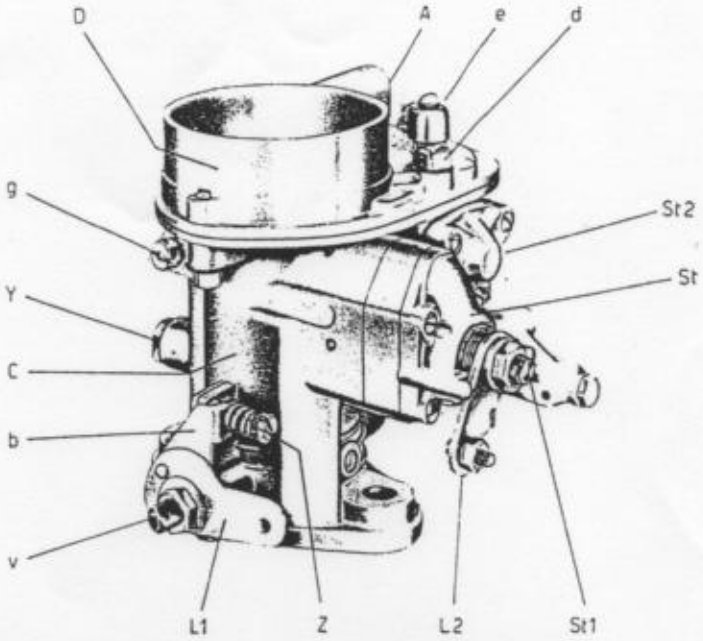


Fig. 1 **Solex Type 40 ICB Downdraught Carburetter**

The **carburetter cover** "D" is fitted to the carburetter body with a gasket between and can be readily detached by taking out **4 screws** "d" to gain access to the interior of the carburetter. On the carburetter cover is the **fuel inlet connection** "A" and – screwed in from the underside – the **float needle valve** "P". To air-vent the float chamber, a **vent cap** "e" is fitted in the cover. This type of carburetter is therefore said to be **"externally vented"** (as distinct from the similar but "internally vented" type used previously).

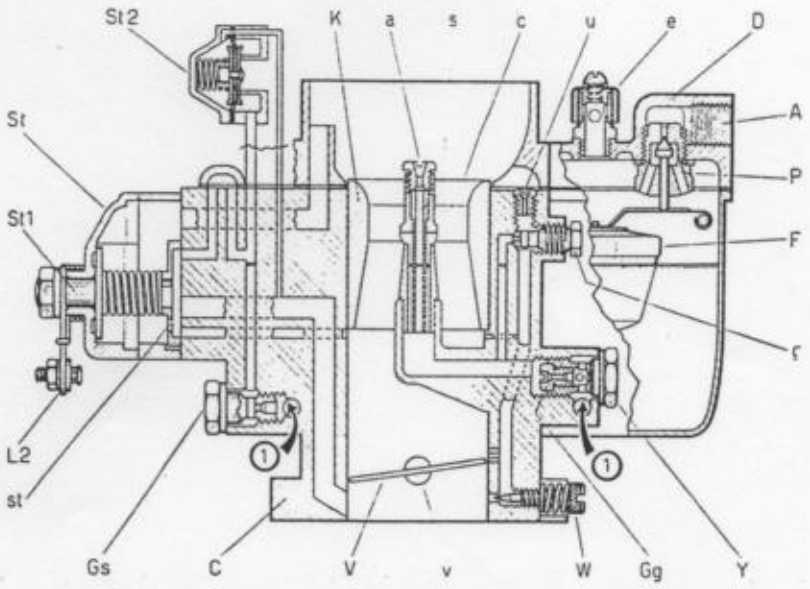


Fig. 2 **Solex Type 40 ICB Carburetter – Sectional Schematic**

The **float assembly** – consisting of the **float** "F" and the float needle valve "P" – holds the fuel in the carburetter at a constant level. When the fuel is at the specified level, the upthrust of the float forces the float needle into the seating and cuts off the inflow of fuel.

Cold Starting

The starter operates in two stages and is virtually a carburetter within the carburetter. The starter will only operate correctly provided that

1. Idling is properly adjusted

2. The accelerator pedal is not operated during starting.

Stage I (Fig. 3)

When the dashboard control is pulled right out the starter is set to the "cold starting" position. The depression set up during starting acts on the starter assembly via the mixture exit duct "d" below the throttle butterfly. The composition of the starting mixture is determined (during stage I) by the starter petrol jet "Gs" and by the starter air duct. With the throttle butterfly closed, the strong suction causes the very rich mixture (about 1:3) needed for starting purposes to be formed in the starter assembly "c" whence it passes into the engine through duct "d" which ends at flange "e".

Fig. 3

Working Principle during Stage I of Cold Starting

C = Starter assembly

d = Starter mixture exit duct

e = Mounting flange

Gs = Starter petrol jet

blue = air

red = petrol

green = controls

zu = Shut

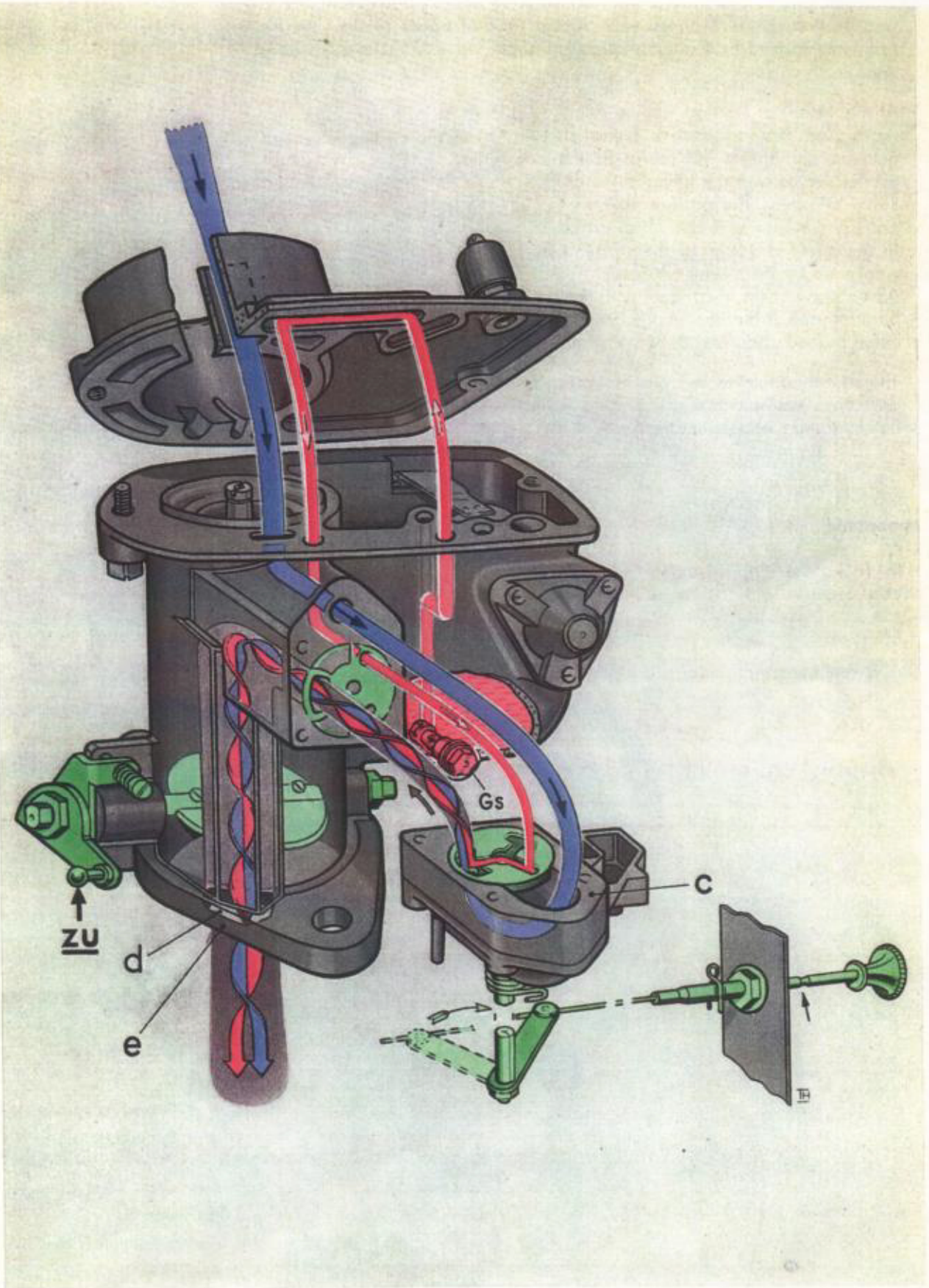


Fig. 3

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Stage II (Fig. 4)

Once the engine has started, the stage II controls cut in automatically to weaken the mixture progressively from a ratio of about 1:6 to 1:9. This task is performed by the automatic diaphragm valve "F" (starter mixture weakening valve).

At the instant of starting, engine revolutions increase with the result that the suction also increases to a marked extent. This more intense suction acts on diaphragm "G" through the connecting passage "H" which communicates with the idling mixture duct "d" so that the spring-loaded valve "F" opens. The extra air thereby fed into the starter mixture forms a primary emulsion with the petrol drawn out of the starter petrol jet "Gs". In the mixer chamber of the starter assembly this primary emulsion is weakened by the starter air feed to yield a usable fuel/air mixture. The advantage of this, in contrast with the action of the earlier types of carburetter used, is that the engine continues running without the starter knob being pushed back, and does not stall due to the mixture being over-rich.

The starter should be cut out of action as soon as possible. If it is left operative, over-enrichment is inevitable and the natural consequence will be increased fuel consumption.

Important

If the fuel consumption is unduly high, check the starter assembly for scoring, special attention being given to the seating action of the starter disc valve.

If necessary, the truth of the valve disc should be tested on a surface plate.

During fuel consumption tests, a blocked starter jet should always be fitted.

Fig. 4

Working Principle during Stage II of Cold Starting

F Diaphragm valve

G Diaphragm

H Connecting passage

d Exit duct (for starter mixture)

blue air

red fuel

green controls

zu Shut

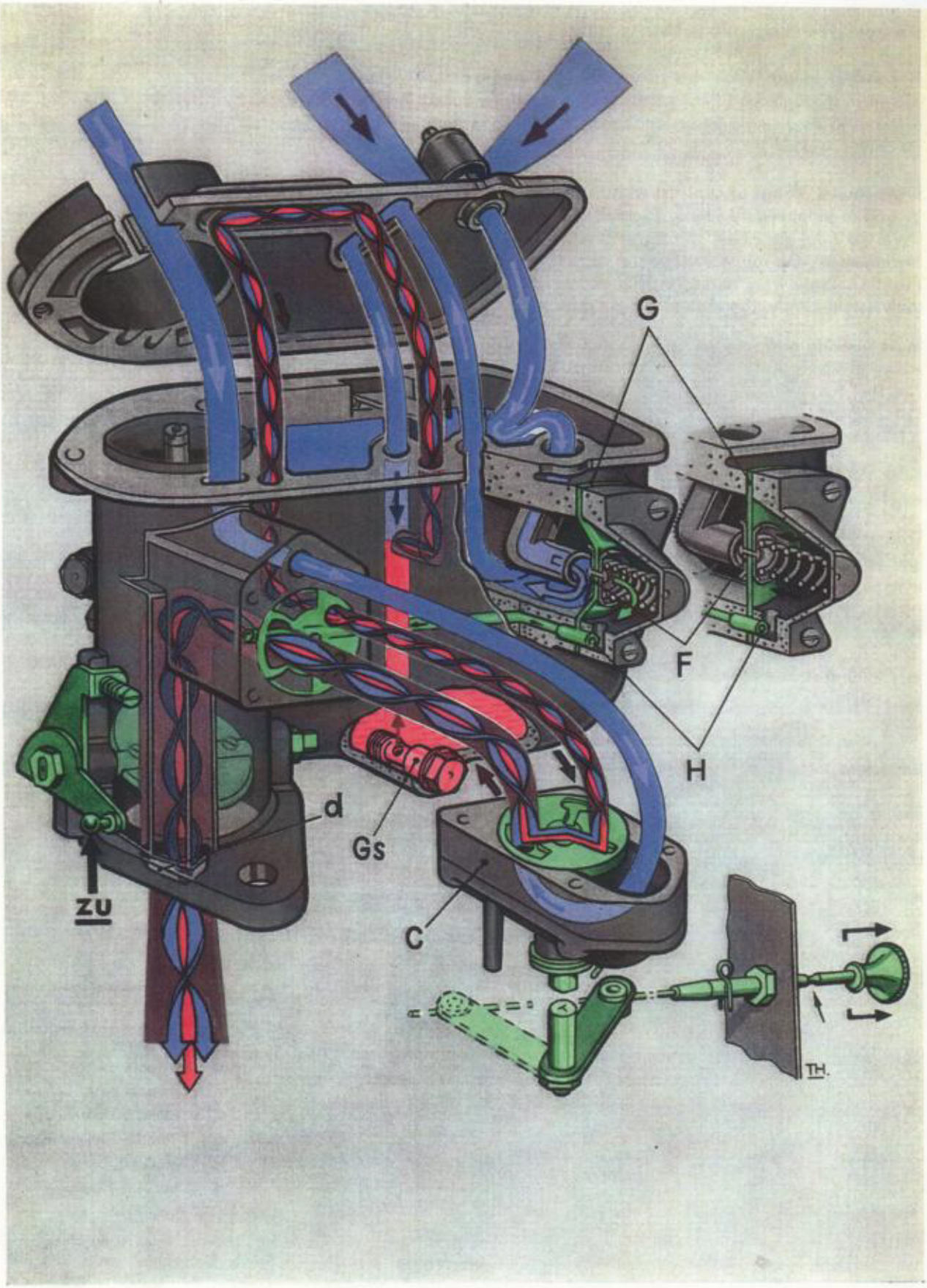

Fig. 4

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Idling System

In most carburetters the fuel supply to the idling system is tapped off behind the main jet and is controlled by the latter.

Dependent Idling: With this arrangement a small amount of extra air is drawn in through the idling jet air bleed as engine speed increases. This is referred to as a single-jet system because the fuel is derived from the main jet only.

Independent Idling: In contrast with the single-jet system, the principle employed in independent idling is to take the fuel for the idling system direct from the float chamber. This is referred to as a twin-jet system. With this arrangement, the idling system plays a part in supplying the mixture at all throttle settings from part load to full load, since the main jet and idling jet deliver fuel jointly. The main jet must therefore be made smaller.

In its working principle the idling system represents an auxiliary carburettor within the carburettor as a whole; in this it resembles the starter assembly. The fuel taken from the main jet system "H" is metered by the idling jet "L" and mixes with the air drawn in through the idling jet air bleed "LL" to form the idling emulsion.

With the throttle butterfly in the idling position (about 8 open) this idling emulsion is drawn into the engine through the idling mixture duct "K".

To keep the engine running smoothly and steadily under the conditions of low depression prevailing during idling, the idling mixture is given a composition of about 11 parts of air to 1 of fuel (by weight) and is therefore richer than the mixture used for normal running. This rich mixture burns slowly and gives smooth running. The exit cross-section of the idling mixture duct "K" can be varied by the idling mixture volume control screw "C". Screwing in reduces and screwing out increases the idling mixture supply to the engine.

Important

The idling mixture volume control screw meters the volume of the fuel/air mixture, and not the amount of air. It must not be confused with the air control screw used on other types of carburetter.

Fig. 5

Working Principle under Idling Conditions

A = Idling mixture exit orifice (variable)
B = By-pass port
B1 = By-pass port
C = Idling mixture volume control screw
D = Throttle butterfly stop screw
H = Main jet
K = Idling mixture duct
L = Idling jet
LL = Idling jet air bleed
zu = Shut

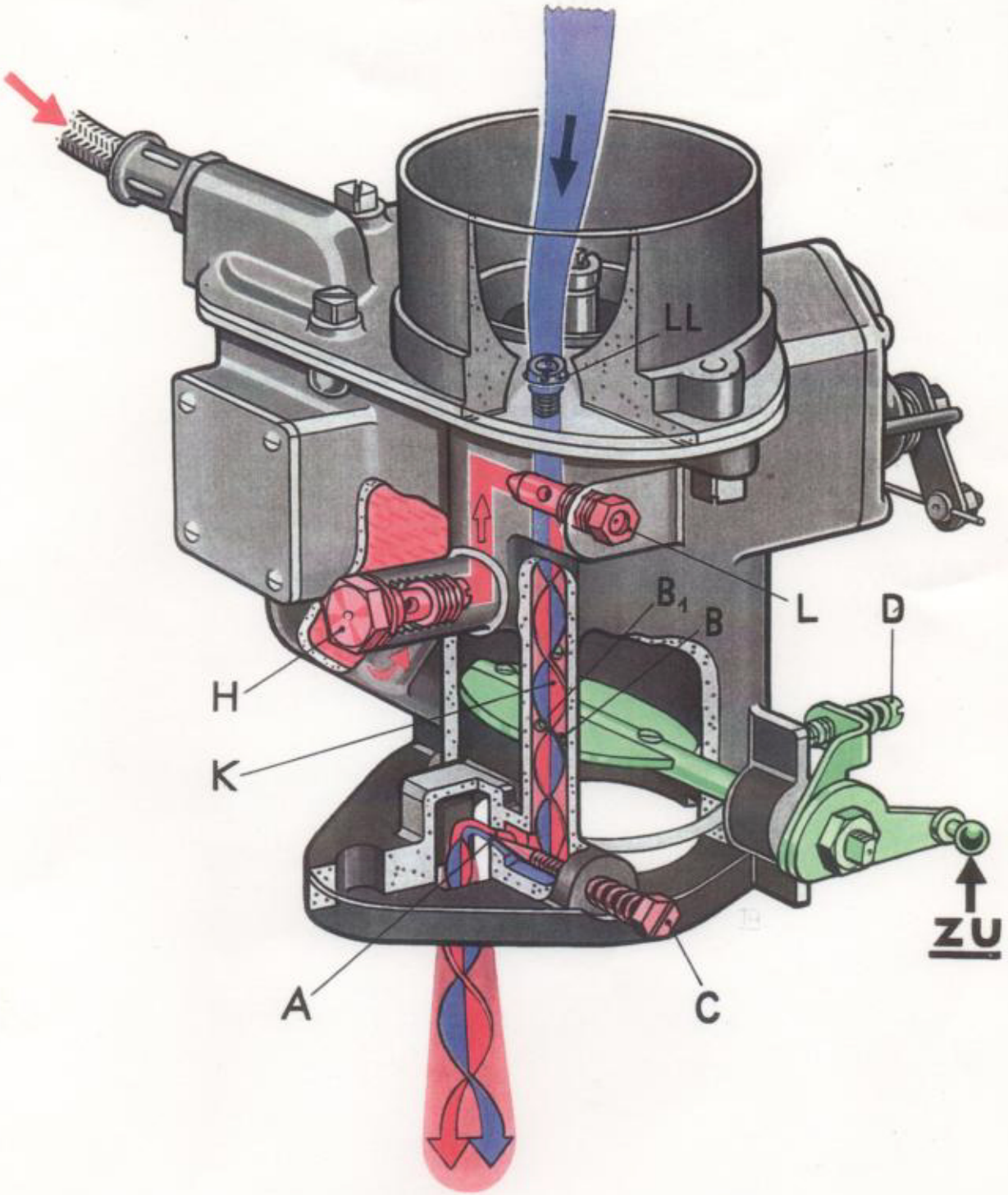

Fig. 5

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Light Load Range

On gradual opening of the throttle butterfly to bring about transition from the idling to the light load range of operation, the two ports "B" and "B 1" – termed by-pass ports – are brought into action (see Figs. 5 and 6).

Port "B" is situated slightly above the gap left by the throttle butterfly (in the closed position) and is therefore subjected to very intense depression or suction. This port supplies the idling emulsion for the first transition stage.

Port "B 1" ist situated somewhat higher than port "B" and does not come into action until the throttle has been opened far enough to give maximum depression in the throttle gap. The purpose of this by-pass is to improve the change-over from the idling system to the main jet system.

On further opening of the throttle butterfly beyond by-pass position "B 1" – that is, shortly before full cut-in of the main jet system – a weakening of the mixture is brought about by the stabilizing port "E".

Note

The idling mixture volume control screw "C" which regulates the idling mixture, should be adjusted only after warming-up the engine.

Fig. 6

Working Principle under Idling Conditions (Light Load Range)

A – Idling mixture exit orifice (variable)

B – By-pass port (situated in throttle gap)

B1 – By-pass port (situated above the closed throttle)

C – Idling mixture volume control screw

D – Throttle stop screw

E – Stabilizing port

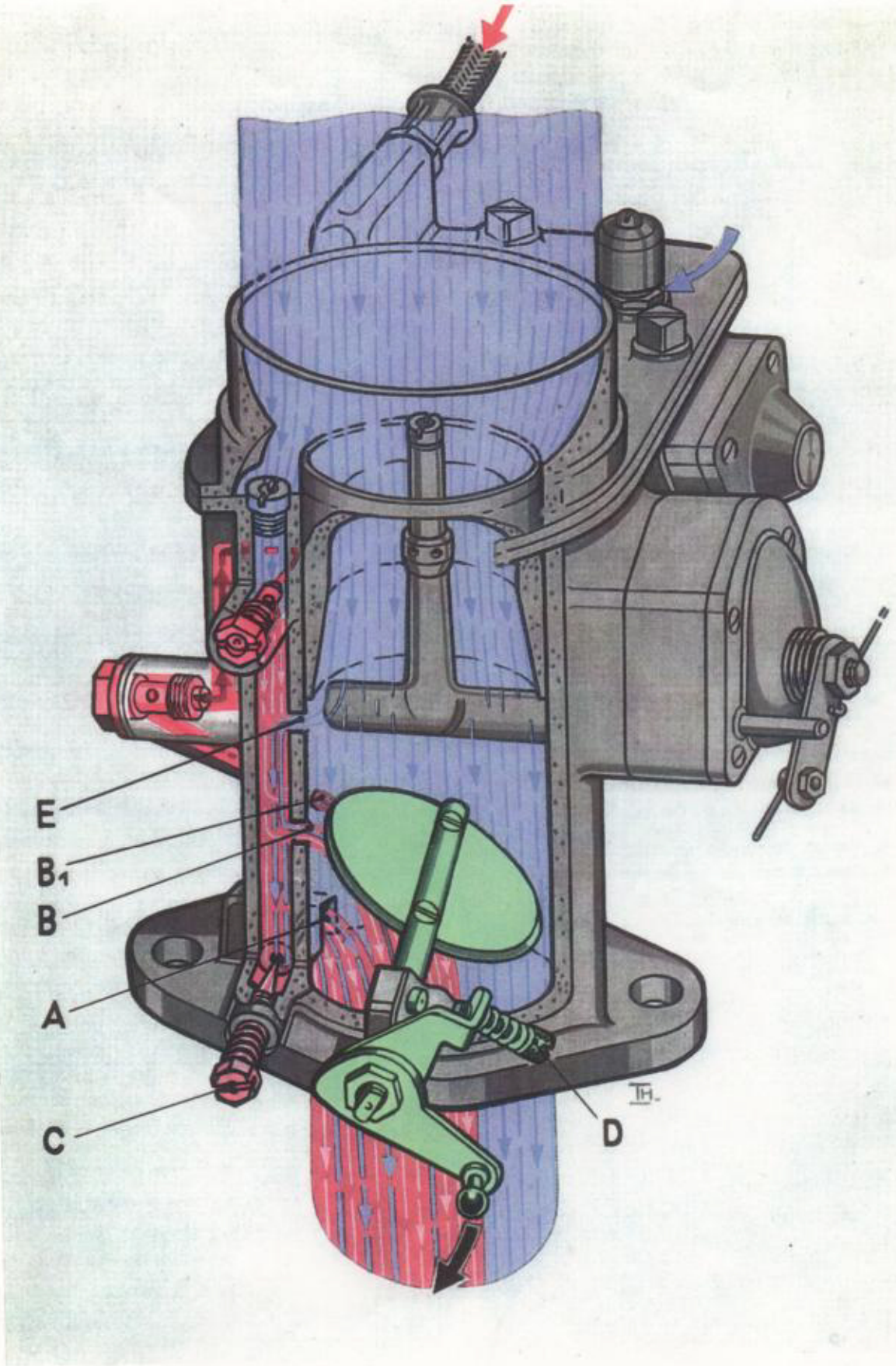

Fig. 6

Main Jet System (Full Load)

In the light load range in which the throttle butterfly is about 30–35 open, the main jet system and the idling system operate jointly. Above about 18–25 m.p.h (30–40 km h) in top gear the main jet system controls mixture formation, the idling system continuing to operate up to about 30 m.p.h. (50 km h). The two systems overlap, but the idling system becomes less and less effective with increasing engine r.p.m.

Mixture preparation in the main jet system is carried out by the following components:

Main jet "H",
Air correction jet "K",
Emulsion tube "L",
Emulsion tube carrier (or spraying well "M") and
Choke tube "N".

The fuel regulated by the float assembly flows through the main jet "H" into the inside of the emulsion tube carrier "M", until the level in the float chamber and in the emulsion tube carrier is the same, and is about 0,0394–0,0788 in. (1–2 mm) below the spraying orifices "O".

With rising r.p.m. and increasing throttle opening, the suction increases likewise. Due to the velocity of the inflowing air, which is still further increased by the throat of the choke tube "N", fuel is drawn out through the spraying orifices "O" in the spraying well and mingled with the air (fuel droplets maintained in suspension in the air).

With a further rise in r.p.m. and increase in depression the fuel in the emulsion tube carrier "M" drops from a level equal to that prevailing in the float chamber to a point where equilibrium is reached between the pressure of the air entering through the air correction jet "K" and the fuel fed in from the main jet.

The compensating air flowing in through air correction jet "K" mixes with the fuel passing through the small holes into the emulsion tube "L" to form an emulsion.

With rising engine speed, the depression also increases, resulting in a faster air flow and heavier pull on the fuel. The compensating air entering through air correction jet "K", however, prevents over-enrichment of the mixture by bringing about the desired weakening of the increased inflow of fuel.

Fig. 7
Working Principle at Full Load

H = Main jet
K = Air correction jet
L = Emulsion tube
M = Emulsion tube carrier
N = Choke tube
O = Spraying orifices in emulsion tube carrier

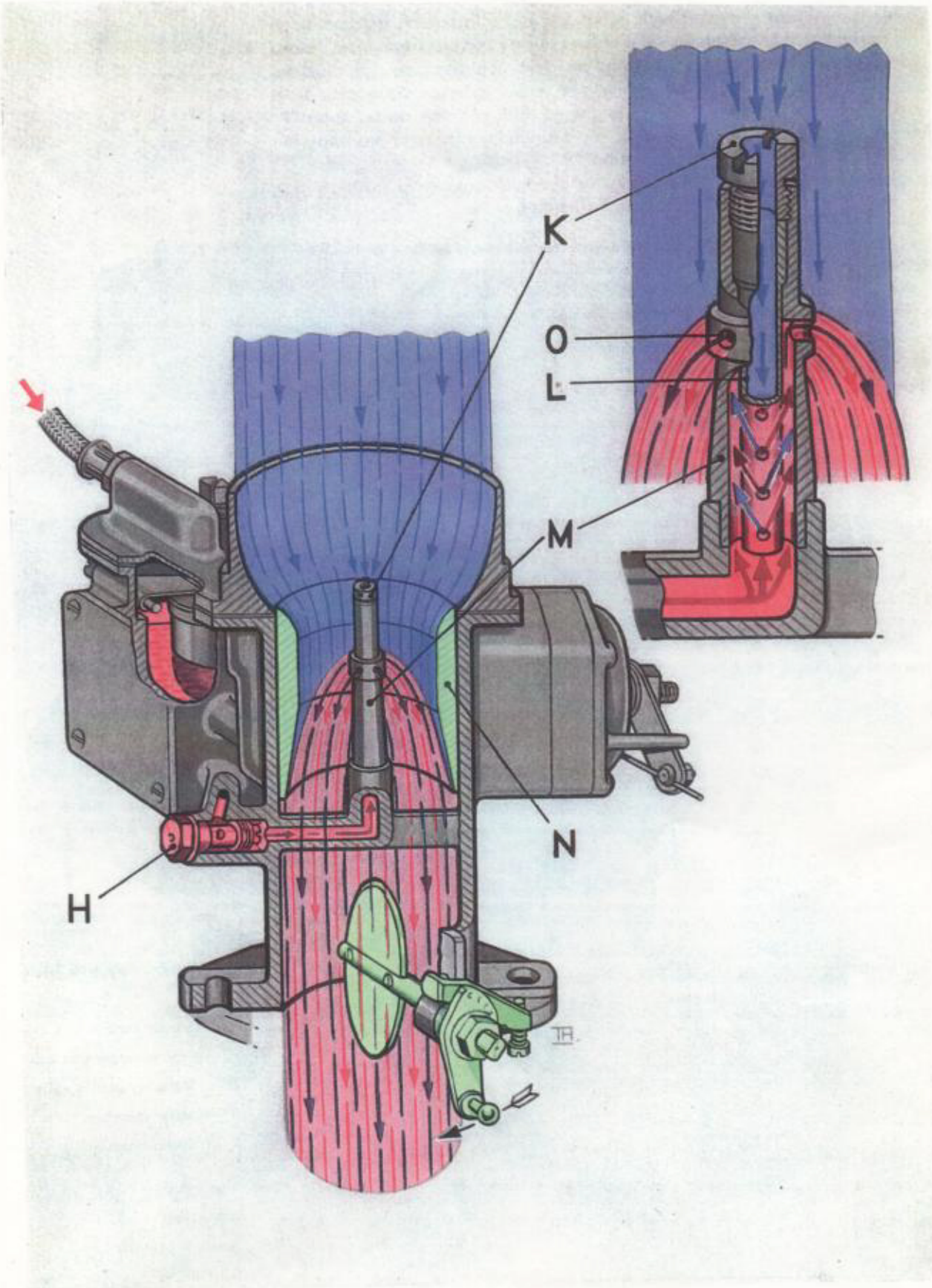

Fig. 7

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Hot Starting

To counteract difficulties arising when starting a warmed-up engine, the starter assembly is provided with a hot starting attachment. As mentioned previously, the heat radiated by the engine during periods of idleness causes evaporation of the readily volatilizing fuel in the float chamber. The resulting over-rich mixture would fail to ignite and would prevent the engine from starting. To avoid this trouble, it is arranged that, with the **starter knob "P" half-withdrawn,** only the volume of air supplied under cold starting conditions is admitted to suction passage "T" through the metering port "R" in disc valve "Q", and in this way the over-rich mixture is instantly and greatly weakened so that no ignition difficulties arise.

This attachment must not be confused with the warm-up feature of the starter units as used on other types of carburetter – for example in the PBI 32 and BI 32 or BIC 32 employed on the Meisterklasse F 89 – which use a greatly weakened starter mixture to facilitate engine warm-up.

Note

During starting, the accelerator pedal must not be operated.

Fig. 8

Working Principle with Starter Assembly set to Hot Starting

P = Starter knob

Q = Disc of rotary disc valve

R = Metering port in valve disc

S = Mixer chamber

T = Suction passage

blue = air

red = fuel

green = controls

zu = Shut

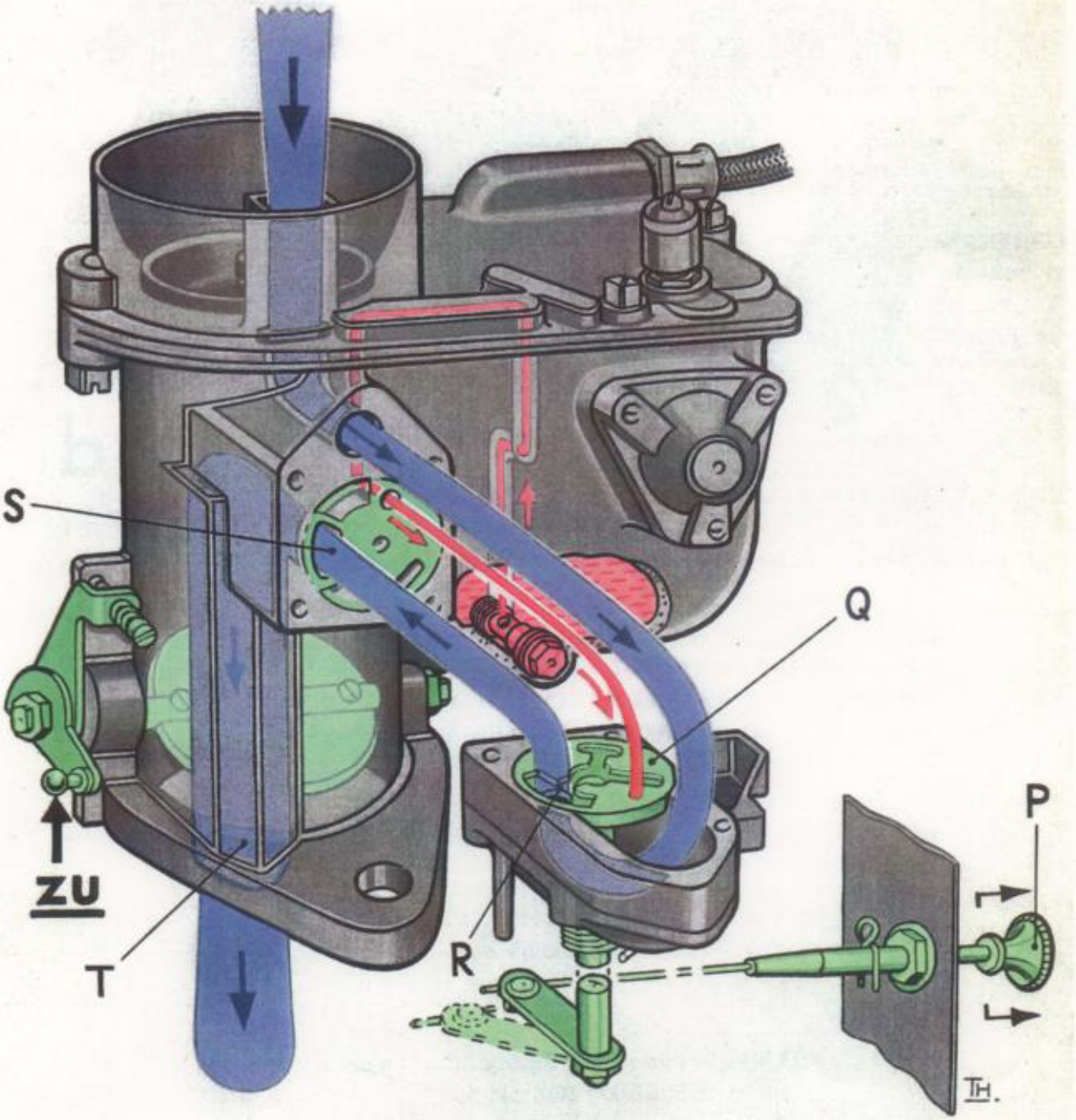

Fig. 8

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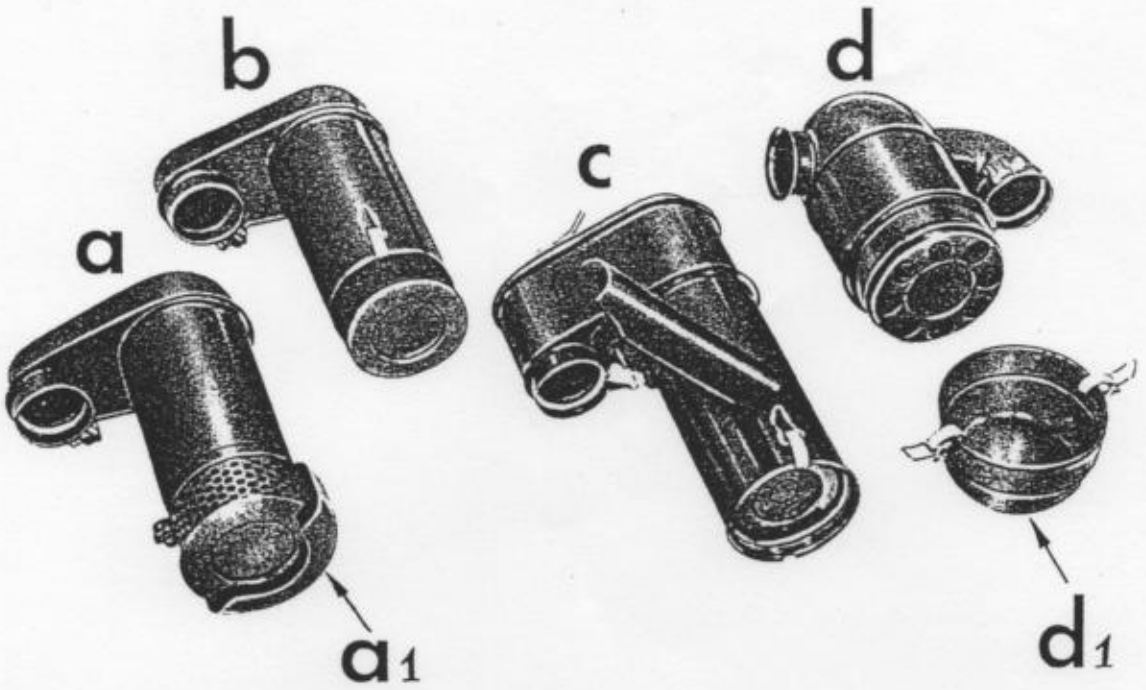

Fig. 9 Range of Air Cleaners for Vehicles fitted with 40 ICB Downdraught Carburetter VI 58 2198

Air Cleaners for AUTO UNION Vehicles fitted with Solex Type 40 ICB Downdraught Carburetter

a = **Air cleaner** Part No. 6403 173 01 06 000
or 6403 173 01 10 000
or 6403 173 01 12 000 plus

a 1 = **Excluder** Part No. 6403 173 16 00 000
fitted with effect from Engine No. 64 024 350 on F 91 three-speed,
and with effect from Engine No. 66 024 350 on F 91 four-speed.

Note

The filter element in this type of air cleaner must not be removed. For this reason cleaning must be carried out by immersing the entire unit in petrol and blowing out with air.

On earlier models the excluder cap "a 1" was not fitted. This meant that trouble often arose through fouling and ingress of water. It is therefore recommended that this cap be fitted as a subsequent addition where necessary.

b = **Air cleaner** Part No. 6403 173 01 06 000 (old Part No. 6403 17 301 09 000)
fitted up to Chassis No. 68 588 302 on F 93 and
up to Chassis No. 70 588 302 on F 94 and
up to Chassis No. 22 515 581 on DKW Commercial Van 3=6

c = **Air cleaner with breather tube** Part No. 6403 173 01 12 000
with effect from Chassis No. 68 588 303 on F 93 and
with effect from Chassis No. 70 588 303 on F 94 and on Auto Union 1000/58 and Auto Union 1000/60 (44 H.P.)

Note

This type of air cleaner is suitable for subsequent fitting to the following vehicles
up to Chassis No. 68 588 302 on F 93 and
up to Chassis No. 70 588 302 on F 94 and
up to Chassis No. 22 515 581 on DKW Commercial Van 3=6
in the manner described below.

d and d 1 = **Oil bath air cleaner with oil bowl** for export models
Part No. 6403 173 01 10 120

Note

The oil used in these cleaners is the same as that employed for engine lubrication purposes. The stream of fresh air drawn into the cleaner impinges on the surface of the oil so that dust particles are trapped by the oil and only clean air passes on to the carburetter.

Due to the dust-trapping action of the oil it is essential that oil changes be carried out at the specified intervals.

fitted up to Chassis No. 68 674 829 on F 93 and
up to Chassis No. 70 674 829 on F 94 and
up to Chassis No. 6812 674 880 and
up to Chassis No. 7010 674 880 on Auto Union 1000

The breather tube of this type of air cleaner extends as far as the air deflector on the exhaust manifold, and this necessitates changing the fan cowl, Part No. 6403 248 01 02 000, for a cowl having a Part No. with the index -02, or modifying the existing cowl, as shown in Fig. 10, by cutting out the fan guard ring and turning over the edge.

The air cleaner with breather tube, Part No. 6403 173 01 12 000, can be subsequently fitted to all vehicles of Types F 93/94 (56 and 57 models) after conversion of the following parts:

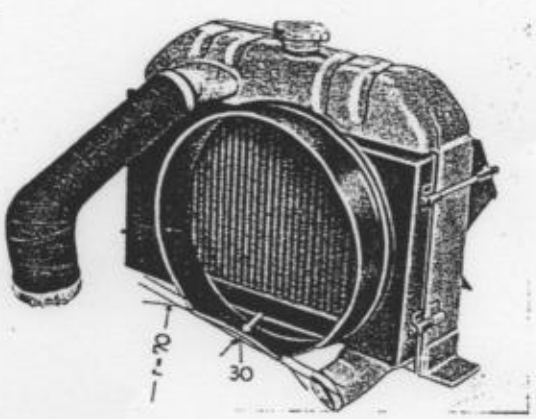

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Fig. 10

Radiator with Modified Fan Cowl

a) **Notes on Modifying the Fan Cowl**

At the bottom of the guard ring a cut-out having a radius of about 2,76 in. (70 mm) and a depth of about, 1,18 in. (30 mm) must be made in the fan cowl and the edge turned over again. This is necessary to make room for the breather tube.

The existing method of pre-heating the carburetter by hot air taken from the radiator can be left intact on the 56 and 57 models unless a new air deflector with summer and winter settings (Part No. 6403 16330 20 000) is fitted. If this type of air deflector is subsequently fitted, the delivery pipe, Part No. 6803 54820 00 000, becomes redundant. In this case the connection on the hot air collector must be plugged.

Note

On Type F 91 vehicles the subsequent fitting of an air cleaner with pre-heating feature is precluded by lack of space.

b) **Change Carburetter Components as listed below**

		A.U. 1000	900 c.c. Engine 58 Models	900 c.c. Engine 55 57 Models
Choke tube		30	29	29
Main jet		132.5	127.5	135
Air correction jet		150	150	260 240
Idling jet		g 55	g 55	g 50
Idling jet air bleed		1.5	1.5	1.5
Starter petrol jet		160	160	160
Starter air jet		–	–	–
Emulsion tube		46	46	2
Plastic float	Weight in lb.	0.016 (7.3)	0.016 (7.3)	0.016 (7.3)
Needle valve	Weight in lb.	1.5 (1.5)	1.5 (1.5)	1.5 (1.5)

Idling mixture volume control screw 3–4 half-turns open

c) **Timing:** retard to o. 118 in. (3 mm) before T.D.C. (with flyweight disengaged).

With effect from Chassis No. 68 674 830 and 70 674 830 for F 93 and F 94 with 900 c.c. engines and with effect from Chassis No. 6812 674 881 and 7010 674 881 for F 94 with 1000 c.c. engine.

Subsequent Fitting of Oil Bath Air Cleaner with Cyclone (baffle chamber) Silencer Part No. 6803 173 01 00 120

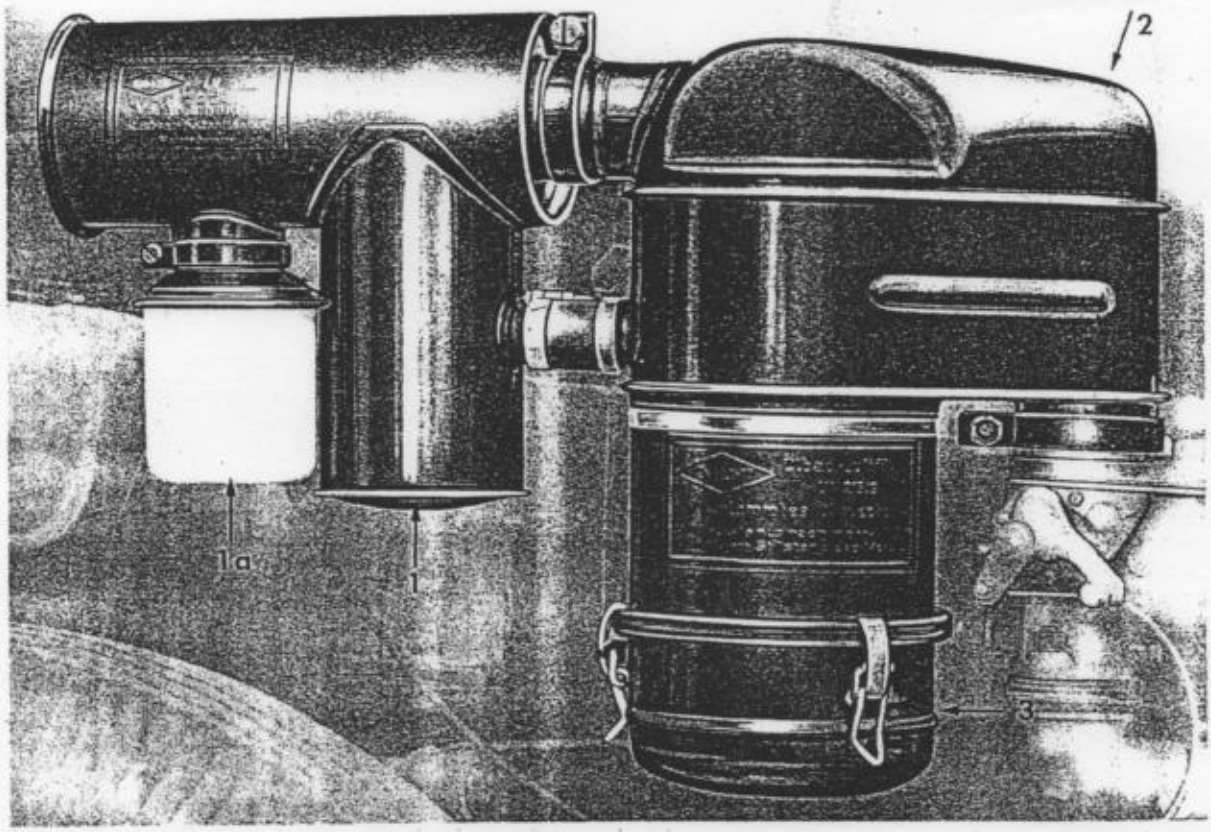

Fig. 11 **Oil Bath Air Cleaner with Cyclone Silencer (Export)** V 59 3438

1 Pre-cleaner
1a Plastic cap
2 Air cleaner
3 Oil bowl

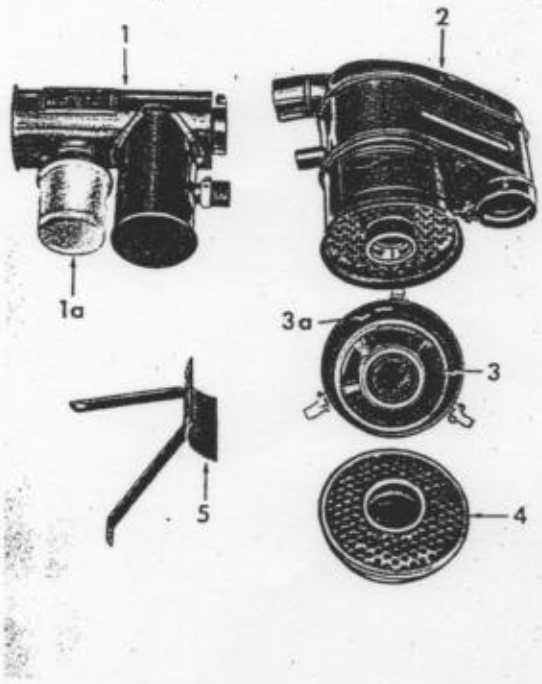

Fig. 12 **Components of Oil Bath Air Cleaner with Cyclone Silencer (for subsequent fitting)** V / 59 / 3439

1 = Pre-cleaner Part. No. 6803 173 05 00 120

1a = Plastic cap

2 = Air cleaner

3 = Oil bowl

3a = Height of oil level

4 = Filter element

5 = Bracket

Oil bath air cleaner compl.
Part No. 6803 173 01 00 120

The subsequent fitting of this unit entails the following changes:

a) **Carburetter Settings**

Main jet	on 900 c.c. engines	formerly 0127.5	now 0120
Air correction jet	on 900 c.c. engines	formerly 150	now 110
Main jet	on 1000 c.c. engines	formerly 0132.5	now 0125
Air correction jet	on 1000 c.c. engines	formerly 150	now 120

b) **Bracket for pre-cleaner** to be attached to cylinder head and induction manifold, as illustrated in Fig. 12, part 5.

c) **Idling:** to be re-adjusted in the usual manner after the engine has warmed up.

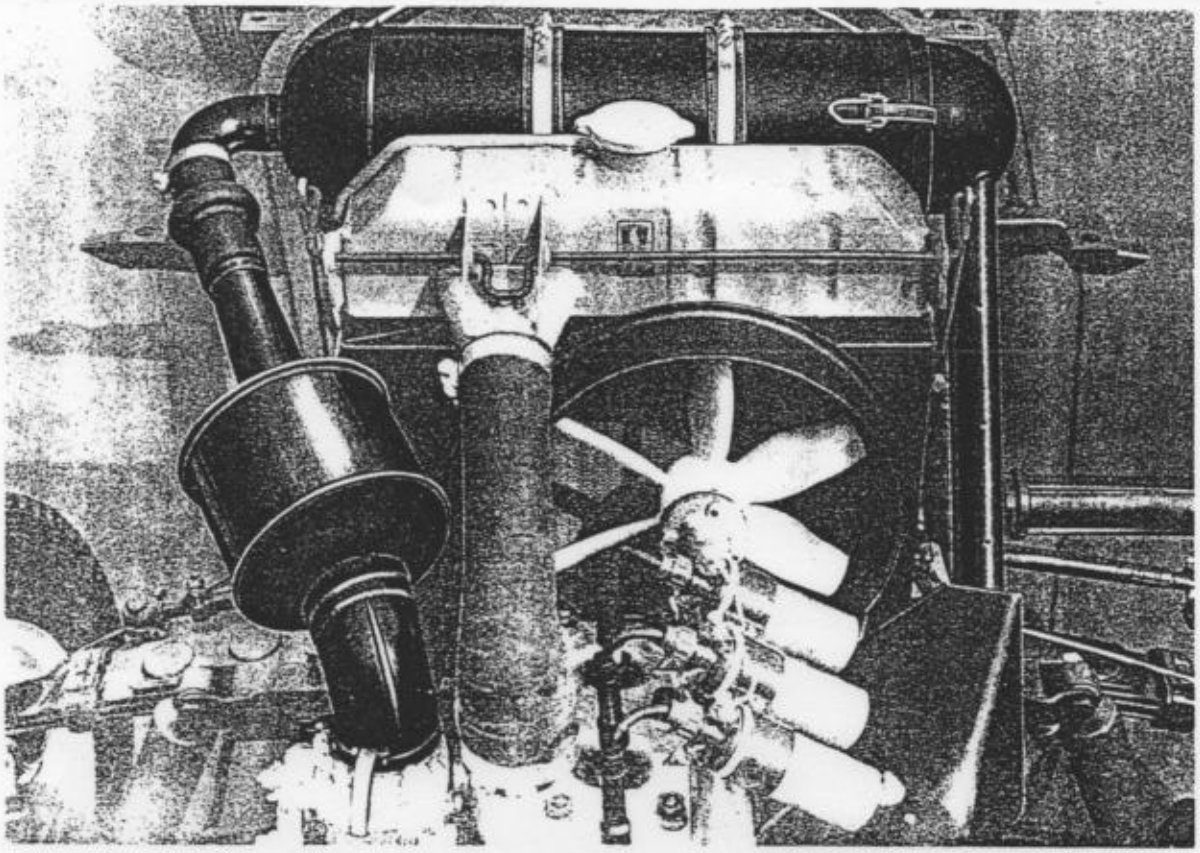

Fig. 13 Intake Silencer and Air Cleaner Unit complete with Pre-silencer 60 / 3962

The intake silencer and air cleaner with pre-cleaner, Part No. 8861 460 51 01 000, is fitted to all AUTO UNION 1000/60 50 H.P. models.

Note

The **correct** position for the breather tube (illustrated at right-hand end of air cleaner) is below the air deflector on the engine in all cases.

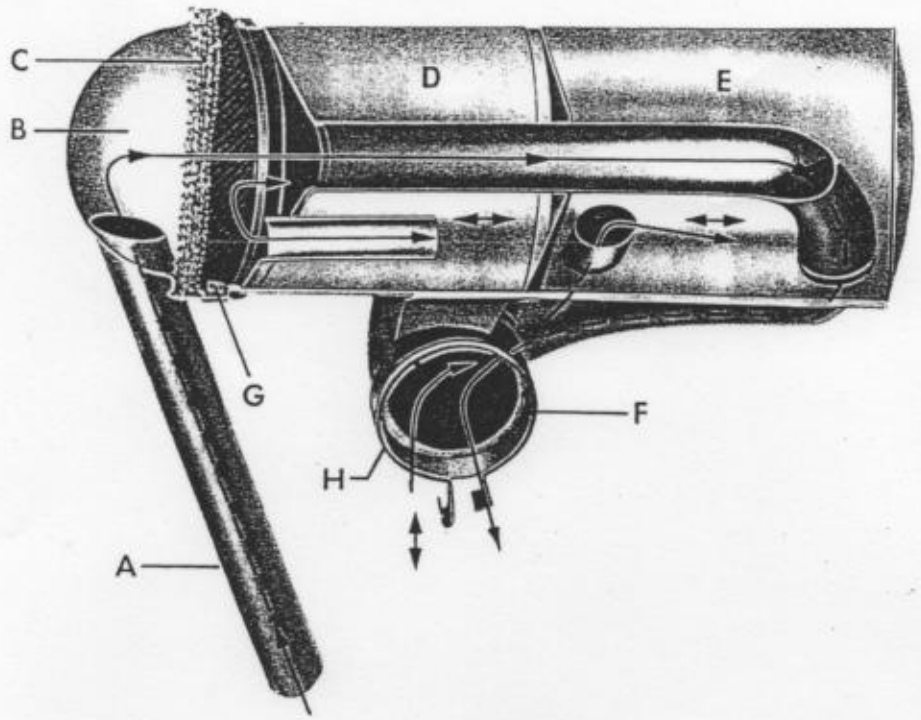

Fig. 14 Oil-wetted Air Cleaner and Intake Silencer F 11

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The air cleaner shown in Fig. 14 for the DKW Junior is an oil-wetted type combined with a silencer unit; it has the Part No. 8801 460 51 00 000.

Its working principle, which also applies in some degree to all the air cleaners considered here is as follows.

The air sucked in by the engine enters the air cleaner through "A" and after passing through the intake pipe and undergoing smoothing in cap "B" impinges on the oil-wetted filter element "C". This element, consisting of a number of layers of "Drillo" mesh fixed in cap "B", removes any dust particles carried by the air. "Drillo" mesh is a multi-layer criss-cross arrangement of narrow metal strips which must be wetted with oil in the usual way. This type of mesh greatly increases the effective filtering area available for cleaning the air induced. Connected in line behind the filter element "C" are chambers "D" and "E". The design and inter-connection of these chambers are such that, apart from damping the intake noise, they are able through their matched relationship to exert considerable influence on the power output and fuel consumption of the engine. Any modification made to these chambers will therefore inevitably detract from engine performance. The filtered air discharged from the air cleaner is taken to the carburettor through outlet "F".

Maintenance

1. Remove silencer and air cleaner unit from carburetter.
2. Open the two snap fasteners on the air cleaner body (not shown in the illustration).
3. Thoroughly clean the oil-wetted filter element "C" plus cap "B" and silencer assembly including chambers "D" and "E" by immersing several times in petrol, then shake out and dry thoroughly.
4. Oil the filter element "C" so that the whole of the filtering area is covered with an oil film; of oiling is only practicable by immersion, all excess oil must be removed by vigorously shaking the unit.

   For filter servicing use the same oil as for engine lubrication purposes.
5. Washers fitted in the silencer unit to seal the filter element "C" and the carburetter connection "H" should be checked and renewed as necessary.

   Re-assemble the unit and re-mount in position, taking care that the joint at the carburetter is tight.

Note

Never just re-oil the filter element "C", but always carry out the complete servicing procedure as described above. The operations detailed under points 1 to 5 above should be carried out every 1550 miles (2500 km), and at more frequent intervals if operating under very dusty or unfavourable conditions.

Important

It is very important to ensure that the inlet end of the breather tube "A" is not dented or bent in any way. Any damage of this kind will cause a disturbance which will upset the entire system and adversely affect power output and fuel consumption figures.

Checking Fuel Level in Solex 40 ICB Downdraught Carburetter

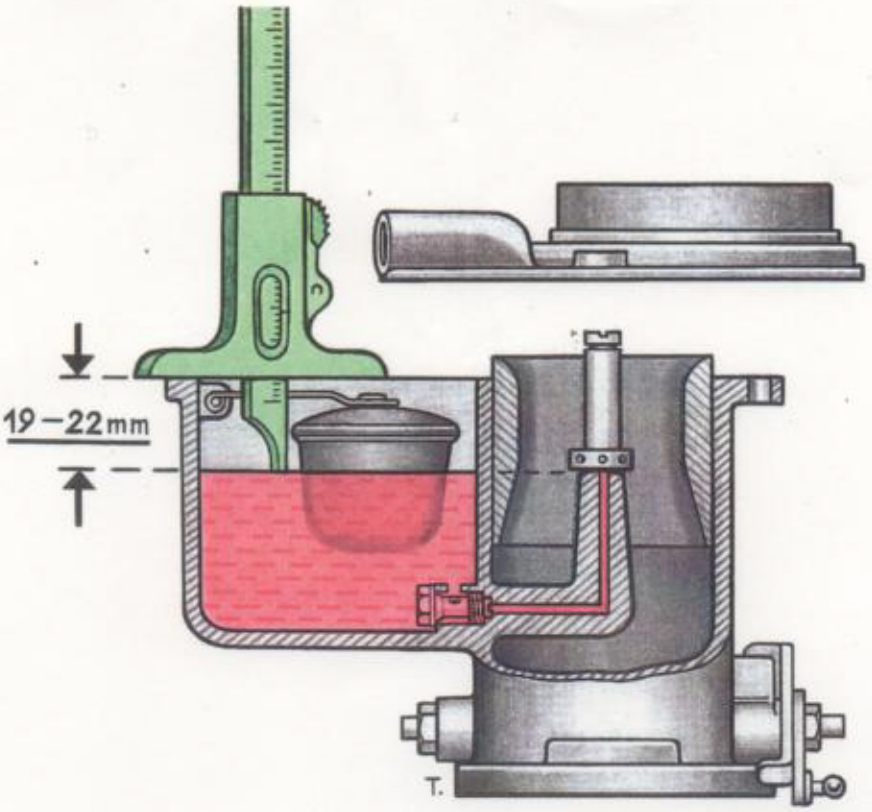


Fig. 15 **Measuring Fuel Level with Depth Gauge** 60 / 5449

By fuel level is meant the height of the fuel in the float chamber as measured from the top of the chamber to the surface of the fuel (see Fig. 15).

This check can be made either with a depth gauge or, as shown in Fig. 16, by the fuel level tester, Part No. 6403 461 03 00 008, in the manner described below. At the same time, the undermentioned points must be carefully observed if an accurate result is to be obtained:

a) Ensure that vehicle is standing perfectly level.

b) Before removing the float chamber cover, allow the engine to idle for about 1 minute, since the pressure exerted by the fuel pump affects fuel level.

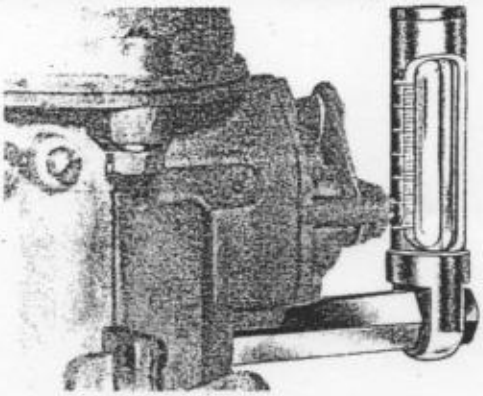
c) Stop engine, disconnect hose between pump and carburettor to prevent any increase in level due to fuel flowing in under residual pressure on removal of float chamber cover.

d) Take off the float chamber cover and measure the height of the fuel level at 3 points with a depth gauge as shown in Fig. 15. Do not hold the blade of the depth gauge too close to the wall of the float chamber.

   Take an average from 3 readings.

   The fuel level in the SOLEX 40 ICB should be 0,75–0,87 in. (19–22 mm).

   A reading outside these figures indicates wear of the float needle valve or a bent float suspension. Correction of the level is made by inserting fibre washers of appropriate thickness under the float needle valve.



Checking Fuel Level in Carburetter with Fuel Level Tester

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To check with this device, take out the starter petrol jet and screw in the fuel level tester in its place. Make sure in this case also that the vehicle is standing perfectly level. Allow engine to run for about 1 minute and then switch off.

The fuel level in the gauge tube should be at a height between 1,46 and 1,58 in. (37 and 40 mm).

Note

An unduly low fuel level will lead to weakening of the mixture, particularly during transfer and accelerating. This gives rise to the effect known as a flat spot. An excessively high level, on the other hand, causes over-enrichment of the mixture and this in turn means increased fuel consumption.

Checking the Needle Valve for Proper Seating

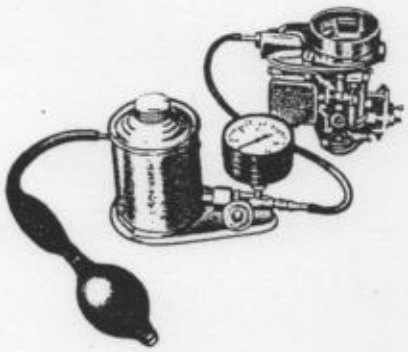

Fig. 17

Checking Needle Valve for Proper Seating

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If the carburetter tends to flood, the seating action of the needle valve must must be checked as follows.

Disconnect the fuel supply line and in its place fit the tube of the needle valve tester (Part No. 6003 461 12 00 008). Shut the tap on the reservoir, fill the reservoir with petroil mixture and re-open the tap. Pump up with the bulb until the gauge reads about 7–8.5 lb./sq. in. (0.5–0.6 kg/cm²). Check whether fuel emerges from the emulsion tube carrier, at the same time holding the pressure at about 5.7 lb./sq. in. (0.4 kg/cm²) by continuing to pump. If fuel emerges, this indicates that the needle valve is leaking and must be replaced.

Carburetter

The Zenith Type 32 NDIX dual-port downdraught carburetter is provided with two suction ports each of 1,26 in. (32 mm) bore. It has a central air inlet and is protected to exclude water and dust. The two jet systems are independent of each other and each has its own choke tube and throttle butterfly. The float chamber containing two plastic floats is common to both systems.

This type of carburetter is fitted to two different models of AUTO UNION vehicles:

a) as an off-the-highway carburetter (internally vented) for the AUTO UNION cross-country vehicle with 900 and 1000 c.c. engine

b) as a high performance carburetter (externally vented) for the AUTO UNION 1000 Sp.

Design Details of the Dual-port Downdraught Carburetter

The Carburetter consists of three principal parts:

a) The float chamber cover

b) The throttle butterfly assembly

c) The float chamber with float assembly

a) **The float chamber cover** is a die casting embodying the fuel inlet connection. It is fitted on the float chamber with a washer between and is held by 5 screws. Screwed into the inner side of the cover are the **needle valve** and the capacity tube. Running crosswise through the air intake is the vent tube for the float chamber and for supplying bleed air to the starter unit. The air intake itself serves as a mounting for the air cleaner.

b) **The throttle butterfly assembly** is of grey iron and is flanged for mounting on the induction manifold of the engine. Running through both suction ports is the **throttle butterfly spindle** carrying the two **throttle butterflies.** Mounted on the end of the spindle is the butterfly lever and an abutment for the idling adjuster screw. Also fitted in the butterfly unit are the two **idling mixture volume control screws.**

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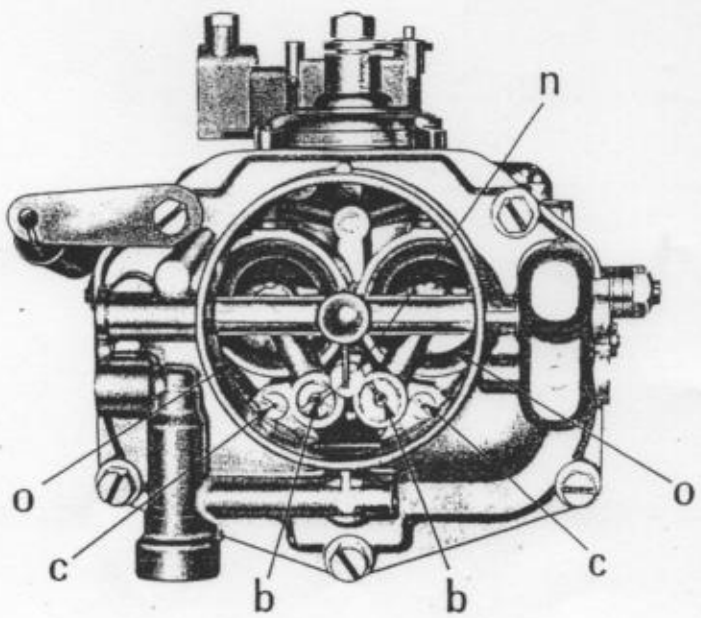

Fig. 18

Zenith-Stromberg Cross-country Carburetter viewed from above

b Air correction jets

c Idling jet air bleeds

n Fixing screw

o Choke tube

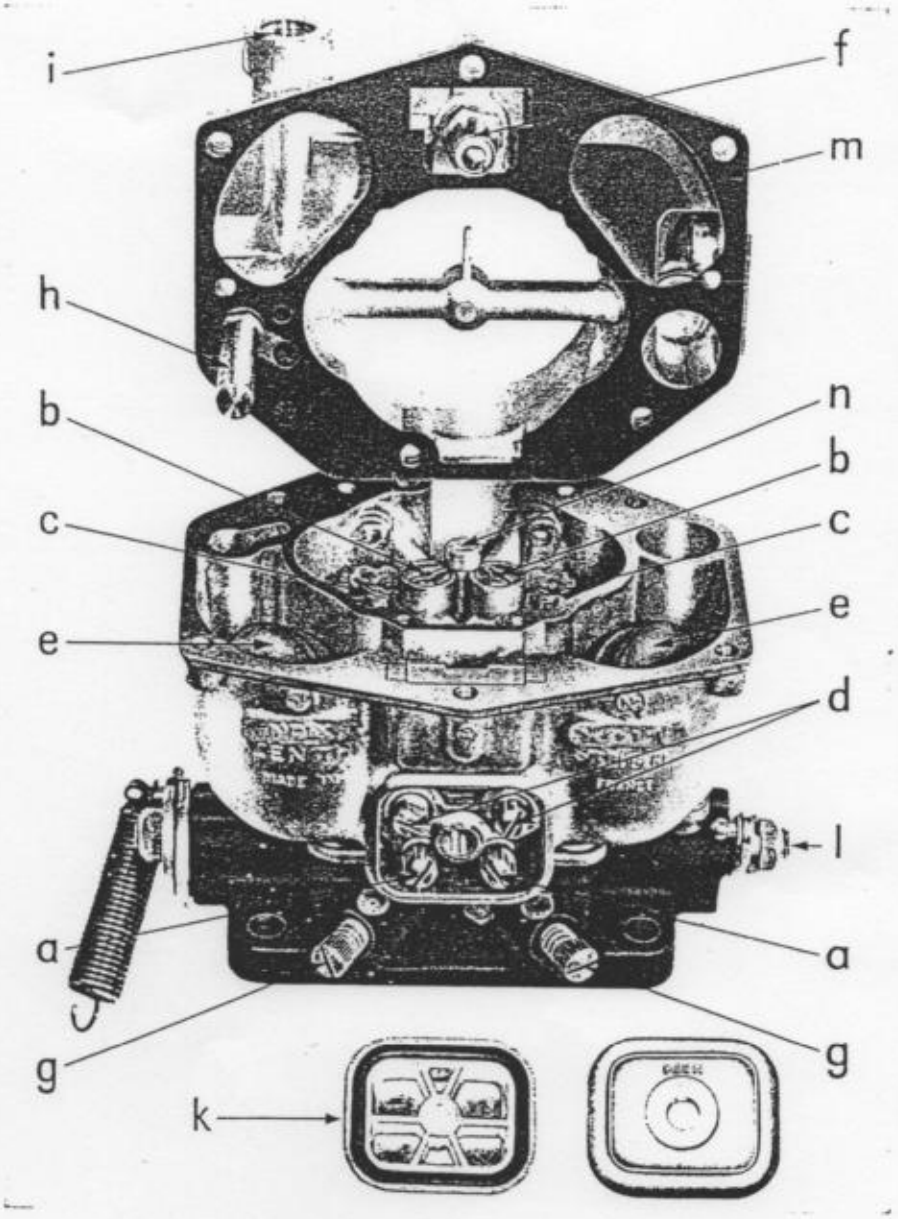

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Fig. 19 **Zenith-Stromberg Cross-country Carburetter shown opened**

	Description	No. off	
a	Main jet	2	
b	Air correction jets	2	
c	Idling jet air bleed	2	
d	Idling jet	2	
e	Dual float with suspension	1	
f	Needle valve	1	
g	Idling mixture volume control screw	2	
h	Capacity tube	1	
i	Fuel inlet connection	1	
k	Cover for jet chamber	1	
l	Butterfly spindle	1	
m	Float chamber cover	1	
n	Fixing screw	1	
o	Choke tube	2	
p	Float chamber cover washer		Not visible in illustration
	Emulsion tube	2	
q	External vent	1	
r	Petrol deflector plate		
	Starter fuel jet	1	

(Fig. 19 shows the "internally vented" version)

c) **Float Chamber and Float Assembly**
The die cast float chamber combines the two mixing chambers and the two-compartment float chamber. The float chamber houses all the parts which prepare the fuel/air mixture for the various ranges of engine r.p.m., and it also contains the float assembly. The starter unit also is mounted on the float chamber. The float chamber and the butterfly unit are firmly screwed together with a washer between.

The float assembly consists of a dual float plus the needle valve already mentioned. The dual float is pivoted and suspended in the float chamber. The purpose of the float assembly is to keep the fuel in the carburettor at a constant level. The duplicated layout of the float chamber and the use of two float units ensures continuity of fuel supply to the engine even when the vehicle is at an angle (cross-country duty).

Other important features of the dual-port downdraught carburetter are as follows.

The starter unit is an auxiliary carburetter which is intended only for starting purposes and for running the engine up from cold under very low temperature conditions. The starter unit produces the starting emulsion which is a mixture of fuel and air.

The starter disc valve has 3 positions and is cable-controlled by the driver.

a) Cold starting
Starter knob pulled right out

b) Hot starting
Starter knob pulled out to half-way point

c) Out of action
Starter knob pushed right back to dashboard.

Idling system. Each suction port has its own idling system which in effect is another auxiliary carburetter.

The idling mixture is determined by the following:

a) **Idling jet** for metering the fuel feed

b) **Idling jet air bleed** determining the volume of air used in making the idling emulsion

c) **Idling mixture volume control screw** determining the volume of the idling emulsion.

Main carburetter. Atomization of the fuel for normal running purposes takes place in the two mixing chambers. In each mixing chamber is a **choke tube** into the top end of which a pre-atomizer projects, the latter being integral with the **emulsion tube carrier.** The two spraying wells are held in the float chamber by a single retaining screw. In each of the spraying wells is an **emulsion tube** which is held in place by the **air correction jet.** The two **main jets** are grouped with the two pilot jets under a cover on the side of the carburetter. A joint washer is fitted under this cover because the space covered by it is in communication with the float chamber and is filled with fuel.

At full load the fuel/air mixture is determined by the following:

a) **Main jet** which meters the fuel flow

b) **Air correction jet** acting as a "compensating jet" to control the inflow of "compensating air"

c) **Choke tube** controlling the main air flow.

Eintritt der Starterluft = Air intake for starting

Belüftungsrohr = Vent tube

Starterdrehschieber = Starter disc valve

Zustrom von Hauptluft durch Drosselklappenspalte = Main air intake through butterfly aperture

Zufluß des Kraftstoffs = Fuel inlet

Startertauchrohr = Capacity tube

Starterkraftstoffdüse = Starter fuel jet

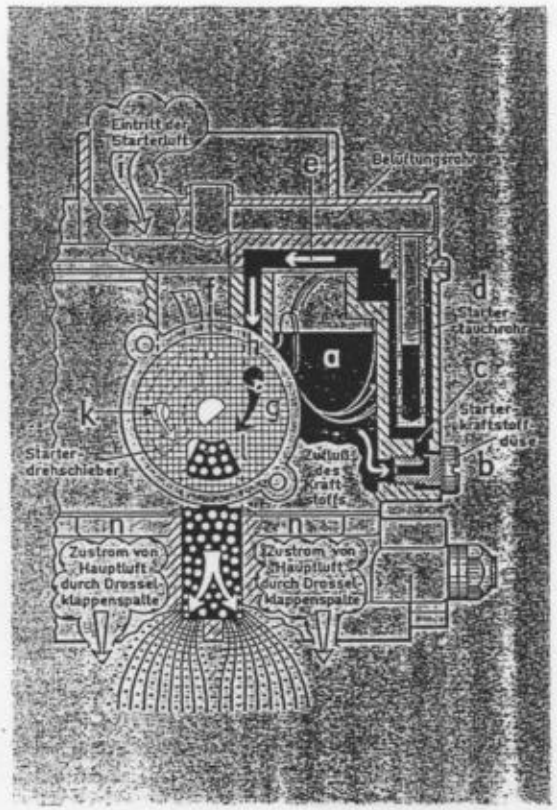

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Fig. 20

Working Principle of Starter Unit – Cold Starting Stage 1

a) **Cold Starting Stage 1**

Starter control pulled right out.

Fuel flows (white arrow) through the starter fuel jet "b" from float chamber "a" into a cylindrical well "c". Dipping into this well from above is the capacity tube "d" which is screwed into the float chamber cover. Well "c" communicates via passage "e" with the starter mixing chamber "f" housing starter disc valve "g".

Depending on the position of starter disc valve "g", the starter mixing chamber "f" is made to communicate by way of ports with the space below the air intake and with the two suction ports in the mounting flange. The three passages concerned are opened and closed by holes and cut-outs in the disc of the disc valve assembly.

When the engine is started the depression acting in the starter system draws on the fuel available in the capacity tube. With the throttle butterfly shut, the intense suction can only act on the starter unit, hence

foot off the accelerator pedal!

Starting fuel passing through port "h" in the starter disc valve "g" is fed, together with starting air "i" arriving from above through calibrated hole "k", as a starting emulsion down through a duct into the two suction ports where the emulsion combines with the air flowing in through the two butterfly apertures to form the starting mixture. This fuel/air mixture (approx. 1:3) ensures satisfactory starting even at low temperatures.

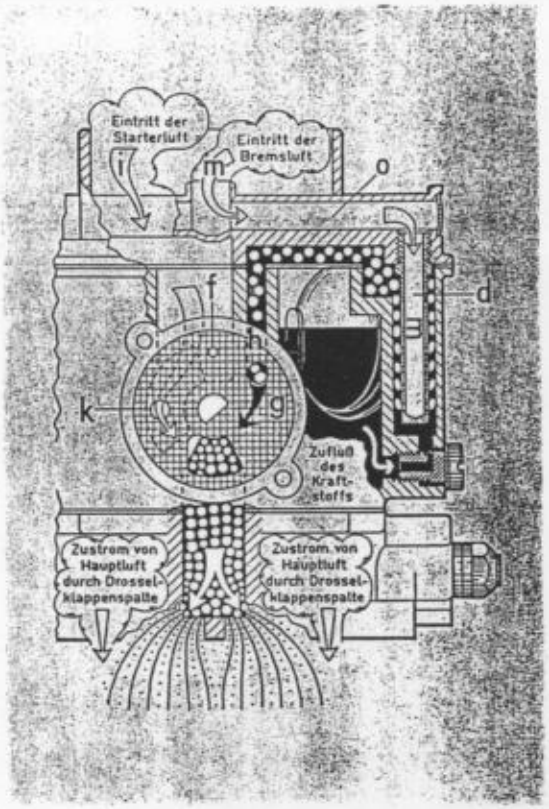

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Fig. 21

Working Principle of Starter Unit – Cold Starting Stage 2

Eintritt der Starterluft = Air intake for starting; Eintritt der Bremsluft = Bleed air intake; Zustrom von Hauptluft durch Drosselklappenspalte = Main air intake through butterfly aperture; Zufluß des Kraftstoffs = Fuel inlet

b) **Cold Starting Stage 2**

Stage 2 of the starting cycle begins as soon as the fuel in the capacity tube "d" is used up. The fuel which subsequently flows through the starter fuel jet is now mixed with bleed air "m" which enters the top of the capacity tube "d" after passing through vent tube "o" in the air intake. The inflowing bleed air mingles with the fuel admitted through the starter fuel jet to form a primary emulsion.

This brings about weakening of the starting mixture (to approx. 1:6) and ensures that the engine will continue to run smoothly and steadily.

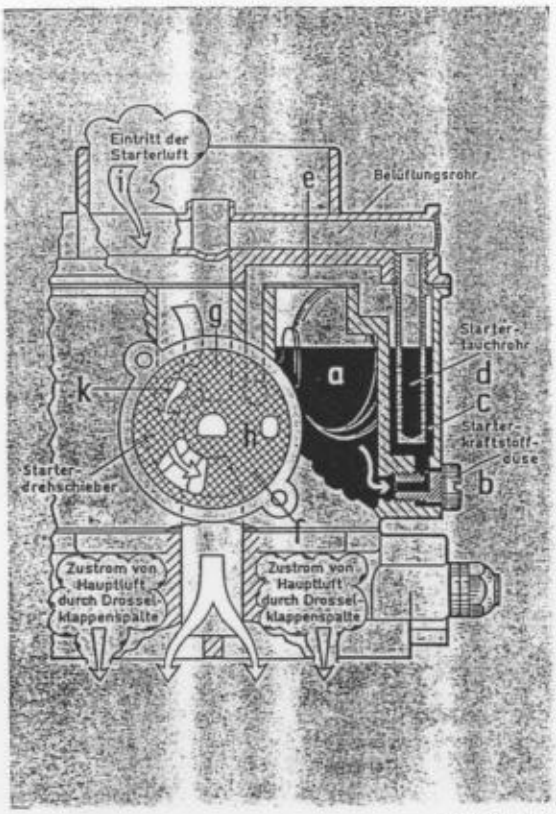

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Fig. 22

Working Principle of Hot Starting System

Eintritt der Starterluft = Air intake for starting

Belüftungsrohr = Vent tube

Starterdrehschieber = Starter disc valve

Zustrom von Hauptluft durch Drosselklappenspalte = Main air intake through butterfly aperture

Startertauchrohr = Capacity tube

Starterkraftstoffdüse = Starter fuel jet

a = Float chamber
b = Starter fuel jet
c = Cylindrical well
d = Capacity tube
e = Duct
f = Starter mixing chamber
g = Starter disc valve
h = Aperture
i = Starting air
k = Hole in valve disc

c) Hot Starting

Starting control pulled half-way out (notch-located)

Hot starting troubles are caused by over-enrichment of the mixture. During idle periods, for example, a very hot engine will radiate heat to the carburetter. This may cause the low-boiling constituents of the fuel to evaporate. The resulting vapours are the first to be sucked in on starting, and owing to oxygen deficiency the fuel/air mixture formed is not readily ignitable, so that normal starting is prevented. If the disc valve of the starter carburetter is now set to the position indicated (starter knob withdrawn) the fuel port "h" of valve "g" no longer communicates with the outlet passage in the carburetter body. This means that no more fuel can flow through starter fuel jet "b". Only starting air "i" continues to be drawn into the induction manifold through starting air port "k". Consequently, only air is sucked in, and this air weakens the over-rich mixture (to about 1:11) so that it becomes ignitable.

The throttle butterflies must, of course, remain closed if the desired effect is to be obtained.

In this case also, therefore – **foot off accelerator pedal!**

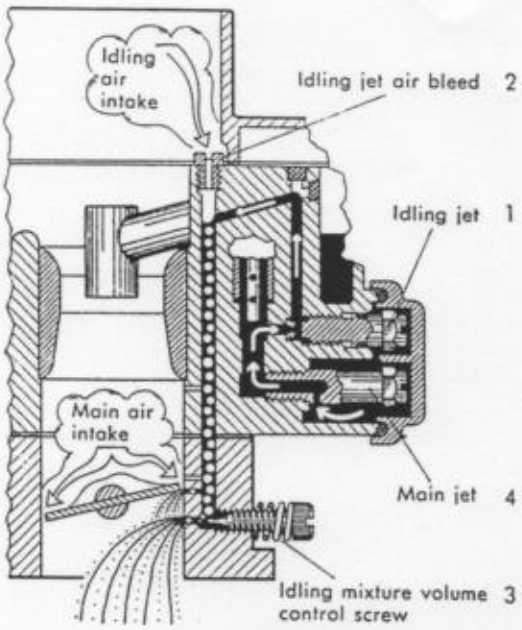

Fig. 23

Working Principle under Idling Conditions

1 = Idling jet

2 = Idling jet air bleed

3 = Idling mixture volume control screw

4 = Main jet

The idling system also takes the form of a small auxiliary carburetter. A separate idling system is provided for each suction port. The idling mixture is determined by

the **idling jet** "1" for metering the fuel flow

the **idling jet air bleed** "2" controlling the air intake rate for the production of the idling emulsion, and

the **idling mixture volume control screw** "3" controlling the volume of idling emulsion delivered.

The fuel required for idling purposes is tapped from the main jet system at a point behind the main "4". With the throttle butterfly closed, the depression acts via the idling mixture duct and the idling jet "1" on the fuel standing at normal level in the emulsion tube. This fuel is drawn up above normal level and mixed with the idling air entering through the idling jet air bleed "2" to form the idling emulsion. This idling emulsion in turn is drawn through the idling duct to the exit hole under the throttle butterfly, where it mingles with the main air flowing through the butterfly aperture to form the idling mixture.

The amount of idling mixture can be controlled by the idling mixture volume control screw "3".

If this control is screwed in the idling mixture becomes **leaner,** if screwed out the mixture becomes richer.

Note

When tuning the idling system, the two idling mixture volume control screws must be adjusted **in succession.**

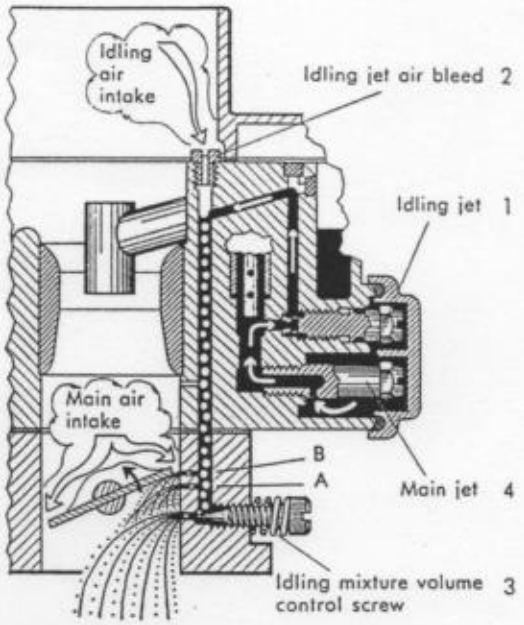

Fig. 24 **Working Principle during Transfer (Part Load)**

1 = Idling jet

2 = Idling jet air bleed

3 = Idling mixture volume control screw

4 = Main jet

A = Lower by-pass port

B = Upper by-pass port

Two further orifices, one being exactly in line with the closed throttle position "A" and the other somewhat higher at "B", are provided and are termed by-pass ports.

These two ports improve the transfer from the idling system to the main jet system. When the throttle butterfly is opened they are acted upon by the depression and deliver extra idling emulsion.

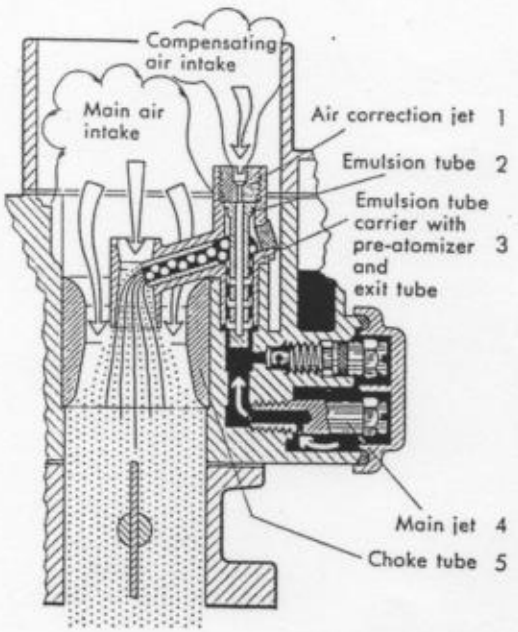

Fig. 25

Working Principle at Full Throttle

1 = Air correction jet

2 = Emulsion tube

3 = Emulsion tube carrier with pre-atomizer and exit tube

4 = Main jet

5 = Choke tube

Preparation of the fuel/air mixture over the part load to full throttle range takes place in the two mixing chambers. Each mixing chamber has a **choke tube** "5" inserted in it. Into each choke tube there projects from above a **pre-atomizer** "3" which is integral with the emulsion tube carrier. The two spraying wells are held in the float chamber (see Fig. 19) by a common retaining screw. In each emulsion tube carrier "3" is an emulsion tube "2" which is held in position by the air correction jet "1" screwed in at the top.

The two **main jets** "4" are grouped with the two idling jets under a cover on the side of the carburetter. A joint washer is fitted under this cover because the space covered by it is in communication with the float chamber and is filled with fuel.

In normal operation the fuel/air mixture is determined by

the **main jet** which meters the fuel flow

the **air correction jet** acting as a "compensating jet" to control the inflow of "compensating air", and

the **choke tube** controlling the main air flow.

When the throttle butterfly is opened and engine r.p.m. increase (thereby increasing the depression) the suction effect in the mixing chambers is intensified. Due to the throat in the choke tube the velocity of the air increases and thereby intensifies the depression in choke tube "5" so that fuel is drawn out of the exit holes in the emulsion tube carriers. In the small pre-atomizers this fuel is first mingled with the main air flow from above to form a fuel emulsion and this in turn is converted into a fuel/air mixture in the choke tube under the action of the air inflow.

Following a drop in level of the fuel in the emulsion tube carriers as a result of increasing depression, compensating air enters through air correction jets "1" and this air passes through the small holes in the emulsion tubes to mingle with the fuel supplied through main jets "4" to form an emulsion. As engine power output increases, more compensating air is drawn into the fuel. This arrangement prevents the over-enrichment of the fuel/air mixture which would otherwise occur, and maintains a more or less uniform mixture composition throughout the entire range of engine r.p.m.

1. Air Cleaners for the AUTO UNION Cross-Country Car

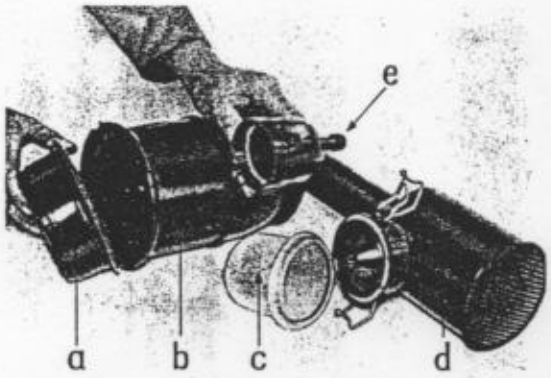

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Fig. 26

Oil Bath Air Cleaner for AUTO UNION 900 c.c. Cross-Country Car

a = Oil bowl
b = Air cleaner housing
c = Dust and water separator
d = Cyclone dust separator
e = Rubber cap

This air cleaner, Part No. 3035 173 02 00 000, is fitted up to Chassis No. **30 507 322** and Chassis No. **3036 000 568** in Types F 91/4 and F 91/6.

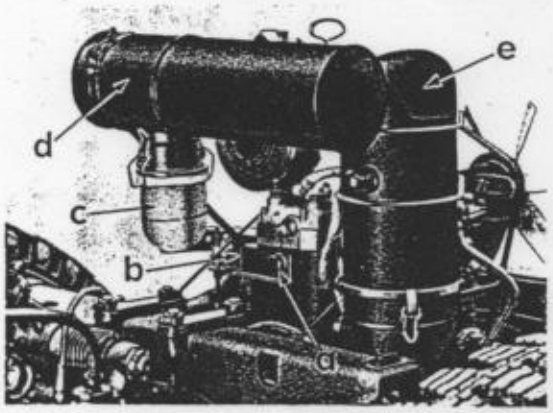

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Fig. 27

Oil Bath Air Cleaner with Cyclone Silencer

a =	Hex. bolt 14 x 15 with washer 14	Part No. 00933 177 31 009
b =	Bracket (supporting pre-cleaner)	Part No. 8843 460 70 00 000
c =	Dust container (plastic bowl of pre-cleaner)	Part No. 3035 173 06 00 000
d =	Pre-cleaner (cyclone silencer)	Part No. 3035 173 05 20 000
e =	Oil bath air cleaner	Part No. 3035 173 02 20 000

The above air cleaner, Part No. 3035 173 02 20 000, with cyclone silencer is fitted as standard with effect from Chassis No. **30 507 364** and Chassis No. **3036 000 569** on F 91/4 and F 91/6. This air cleaner is also fitted to Types F 91/1000/4 and F 91/1000/6 with effect from Chassis No. **3038/3039 000 001.**

Care must be taken to ensure that the variable parts of the carburetter conform to the list given on a later page.

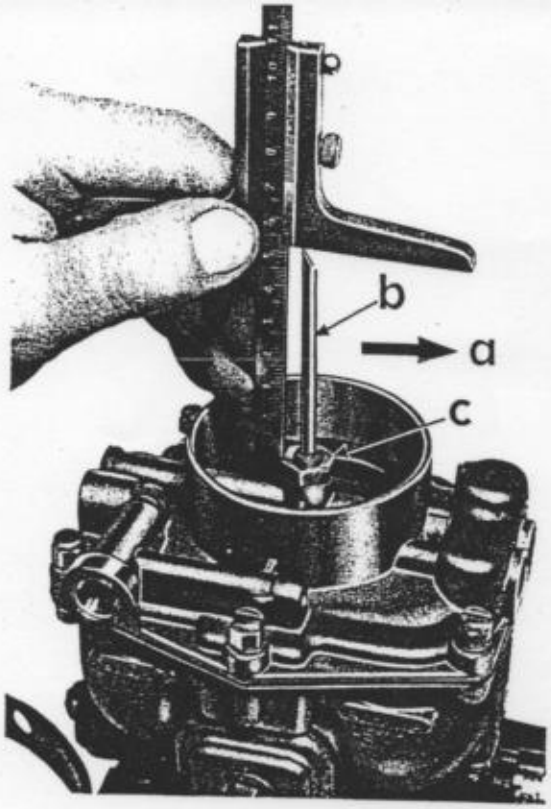

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Fig. 28

Fitting Internal Vent Tube

a = Normal direction of travel, i.e. forward

b = Internal vent tube, Part No. 8843 469 42 00

c = Lock nut (belongs to tube)
(Refer also to section on venting the float chamber under the heading "General")

Subsequent Fitting of Oil Bath Air Cleaner with Large Cyclone Silencer

The subsequent fitting of an oil bath air cleaner with large cyclone silencer (low-noise air cleaner) is carried out in the following manner.

a) Parts required:

1 oil bath air cleaner	Part No. 3035 173 02 20 000
1 pre-cleaner (cyclone silencer)	Part No. 3035 173 05 20 000
1 bracket	Part No. 8843 460 70 00 000
1 hex. bolt M 14x15	Part No. 00933 177 31 009
1 washer 14	

b) Screw 2 main jets 110, Part No. 3055 172 13 14 000 into the carburettor.

c) Fit the internal vent tube, as shown in Fig. 28, with the slanting orifice at the top end facing forward in the normal direction of travel. Check setting with a depth gauge, screw in to about 2.8 in (71 mm) and tighten hex. nut "c" securely.

d) Unscrew screening cover from ignition coil holder and position middle coil about 0.8 in. (2 mm) higher.

e) Attach bracket to cylinder with M 14x15 hex. bolt as shown in Fig. 27.

f) Adjust idling by means of the two idling mixture volume control screws.

Specification of Variable Components Required when Fitting Oil Bath Air Cleaner with Low Noise Cyclone Silencer

Engine capacity	900 c.c.	1000 c.c.
Main jet	2x110	2x110 or 112
Air correction jet	2x140	2x110
Idling jet	2x 45	2x 45
Idling jet air bleed	2x160	2x160
Starter fuel jet	1x160	1x160
Choke tube	2x 23	2x 24
Emulsion tube	2x 4S	2x 4S
Needle valve	1x 2.0	1x 2.0
Fuel level	0.67–0.75 in. (17–19) (Measured by depth gauge)	0.67–0.75 in. (17–19)

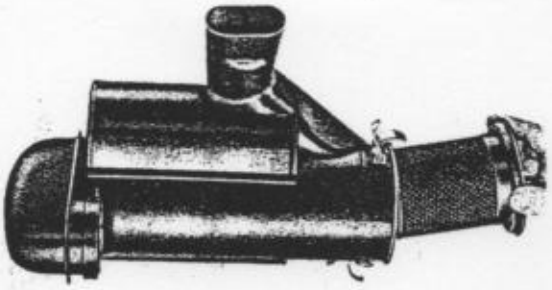

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Fig. 29

Air Cleaner for AUTO UNION 1000 Sp

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Fig. 29a

Removing and Refitting Air Cleaner in AUTO UNION 1000 Sp
(End of starter control cable raised)

The above air cleaner, Part No. 8861 460 51 00 000, is fitted up to Chassis No. **6815 000 337,** and with effect from Chassis No. **6815 000 338** up to Chassis No. **6815 001 020** air cleaners with the same Part No. have the quick-release fasteners fitted 90° round.

The carburetter set-up for this air cleaner is as follows:

Choke tube	2x 24
Main jet	2x115
Air correction jet	2x120
Idling jet	2xg50
Idling jet air bleed	2x160
Starter fuel jet	1x130
Fuel level	0.67–0.75 in. (17–19 mm) (Measured by depth gauge)

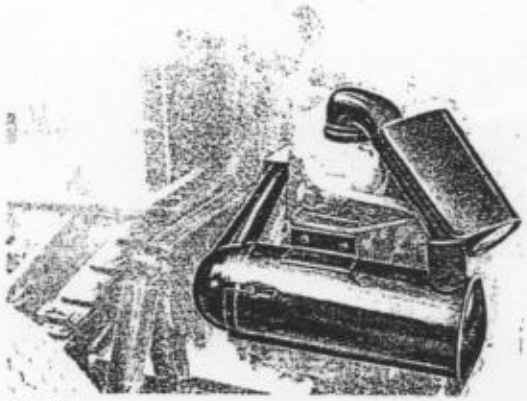

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Fig. 30

Air Cleaner with Pre-cleaner Unit on AUTO UNION 1000 Sp

This air cleaner and pre-cleaner assembly consisting of an intake silencer, Part No. 8861 460 52 03 000 and elbow, Part No. 8861 460 58 02 00, is fitted with effect from Chassis No. **6815 001 021.**

This low noise air cleaner can also be fitted to all AUTO UNION 1000 Sp vehicles **below** Chassis No. **6815 001 021** in the manner described below (under a to d).

a) The carburetter set-up must be changed in accordance with the list below.

b) Change the existing petrol deflector plate for Part No. 8861 460 40 01 000.

c) Fit the bent tube, Part No. 6815 841 06 06 000, in the water hose between the pump and thermostat.

d) Carburetter set-up when using air cleaner plus pre-cleaner consisting of intake silencer, Part No. 8861 460 52 03 000 and elbow, Part No. 8861 460 58 02 000.

Choke tube	2 x 25
Main jet	2 x 011.5
Air correction jet	2 x 140
Idling jet	2 x g 50
Idling jet air bleed	2 x 160
Starter fuel jet	1 x 130
Fuel level	0.67–0.75 in. (17–19 mm) (Measured by depth gauge)

Checking Fuel Level and Needle Valve

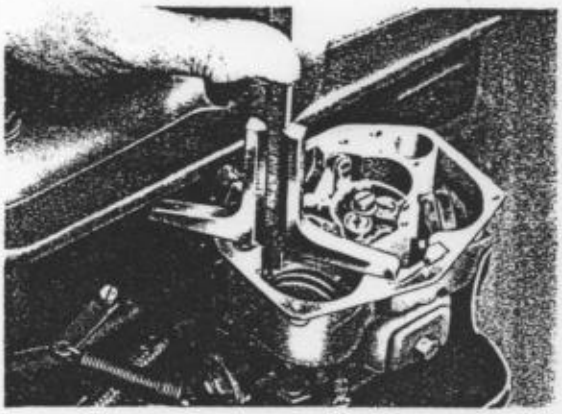

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Fig. 31

Measuring Fuel Level with Depth Gauge (32 NDIX Zenith)

When checking fuel level the same points are to be observed as mentioned previously in connection with the SOLEX 40 ICB on page 30 under paragraphs a to d plus Note.

Checking Needle Valve for Proper Seating

See description on page 31.

The SOLEX BFLH 30 Horizontal Carburetter

For AUTO UNION DKW vehicles with 600 and 700 c.c. engines of Types F 7 / F 8 / F 10 and F 89 L (three-speed).

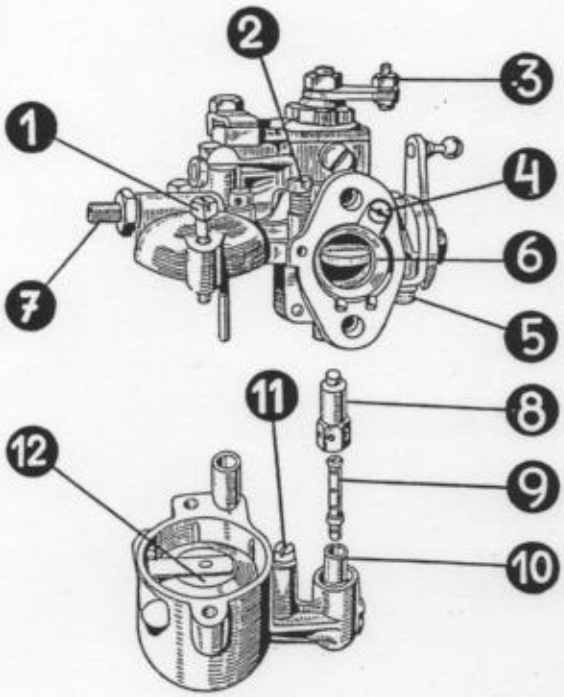

Fig. 32

SOLEX Type BFLH 30 Horizontal Carburetter (Part No. 1817 172 01 01 000)

1 = Fixing screw for float chamber
2 = Idling air control screw
3 = Starter unit control lever
4 = Starter unit air bleed
5 = Butterfly stop screw
6 = Choke tube
7 = Fuel inlet connection
8 = Jet cap
9 = Main jet
10 = Jet block
11 = Idling jet
12 = Float

The principal parts of this carburetter are

a) The float chamber

b) The butterfly assembly

c) The cover assembly.

The butterfly assembly and the cover assembly are screwed together. The float chamber can be removed on taking out two fixing screws "1".

The float assembly consists of float "12" and the needle valve. The function of this assembly is to keep the fuel level constant at the required height.

Preparation of the fuel/air mixture needed for starting, idling, part load and full throttle conditions is provided by the main jet system and by starting and idling units.

The Starter Unit

The automatic starter unit is a small auxiliary carburetter intended for starting the engine from cold. The starter unit is cut in and out by a cable control extending to the dashboard. On carburetters of the older type having the starter air bleed located internally, a 0,078–0,118 in. (2–3 mm) hole is necessary in the plate under the disc valve to ensure proper venting of the starter unit at all times. This hole can be drilled later as a modification.

The starter unit is responsible for producing the starting emulsion which is a mixture of fuel and air bubbles. The starting emulsion is formed by the starter fuel jet "Gs" which meters the fuel flow and by the starter air bleed "Ga" which controls the air inflow rate (see Fig. 32 "4").

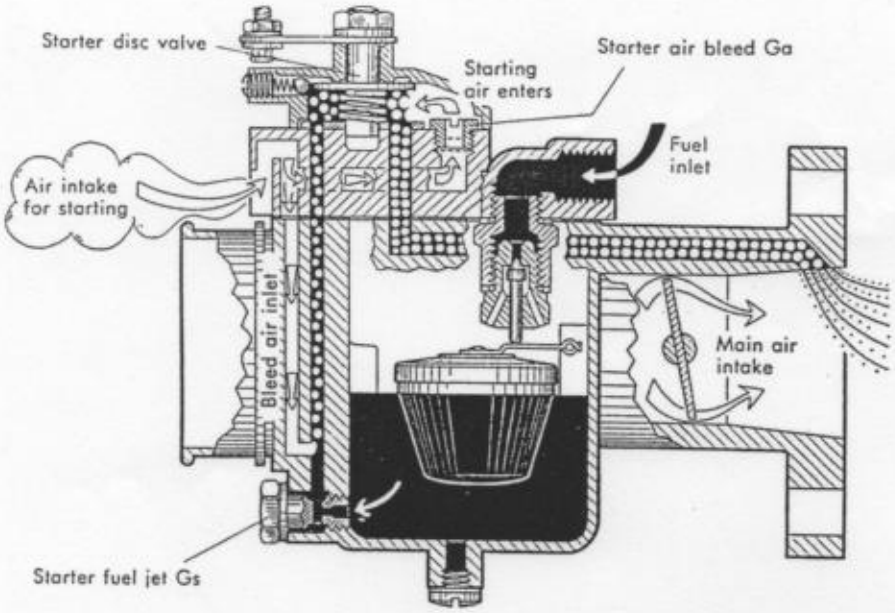

Fig. 32a

BFLH 30 Horizontal Carburetter – Working Principle of Starter Unit

a) **Cold Starting Stage 1**

Fuel flows from the float chamber through the starter fuel jet "Gs" into the vertical starter well. Projecting down into this well is the starter dip tube. The latter is open at the top end so that atmospheric air can enter. A communicating passage connects the starter dip tube via the disc valve to the mixing chamber of the starter unit. Initially, the fuel level in the float chamber, in the starter well and in the dip tube is the same. On starting the engine with the starter control pulled right out (so that the starter disc valve puts the starter system in direct communication with the engine side of the throttle) the depression set up with the throttle closed acts on the fuel reserve in the starter well and in the starter dip tube. The fuel drawn from here mingles in the starter mixing chamber with the air drawn in through the starter air bleed to form the starting emulsion.

In the intake system, the starting emulsion mingles with the air passing through the butterfly aperture to form a rich starting mixture to ensure reliable starting of the engine from cold.

b) **Stage 2**

After the engine has fired and its speed has started to increase as a result of warming up, there takes place automatic weakening of the initially rich starting mixture. The starter fuel jet passes only an accurately metered flow of fuel, whilst the intensified depression causes more air to be drawn in at the top of the open starter well so that the primary emulsion is weakened accordingly.

This only applies, however, provided that the throttle butterfly is closed. In this case also, therefore, when starting – take your

foot off the accelerator pedal!

After warm-up, the starter control should be pushed back to avoid excessive fuel consumption.

Special Publication No. 1

Carburetters

AUTO UNION G·M·B·H Düsseldorf · Ingolstadt

The Idling System

The idling system also is a small auxiliary carburetter. The composition of the idling emulsion is determined by the **pilot jet** which is available in different sizes and which determines the rate of fuel flow, and by the adjustable **idling air control screw** which regulates the air inflow. The fuel supplying the idling system is taken from the float chamber of the main jet system. This fuel is fed into a well closed at the top by the pilot jet, the fuel level in the well being the same as in the float chamber. With the throttle butterfly virtually closed, the depression set up by the engine acts first of all on the pilot jet only. The fuel emerging from the pilot jet mingles with the inflow of outside air, the volume of which is controlled by the idling air control screw, to form the idling emulsion. This emulsion emerges through exit holes near the butterfly aperture and then mingles with the main air flow to form the idling mixture.

The mixture is **enriched** by **screwing in** the idling air control screw, and **weakened** by **screwing it out.**

The idling speed of the engine can be adjusted by means of the idling adjuster screw.

The Main Carburetter

The principal feature of the BF type of carburetter is the bleed air jet. The fuel/air mixture for the part load to full throttle range is formed by the **main jet** which determines the volume of fuel, and by the **choke tube** which controls the flow of air.

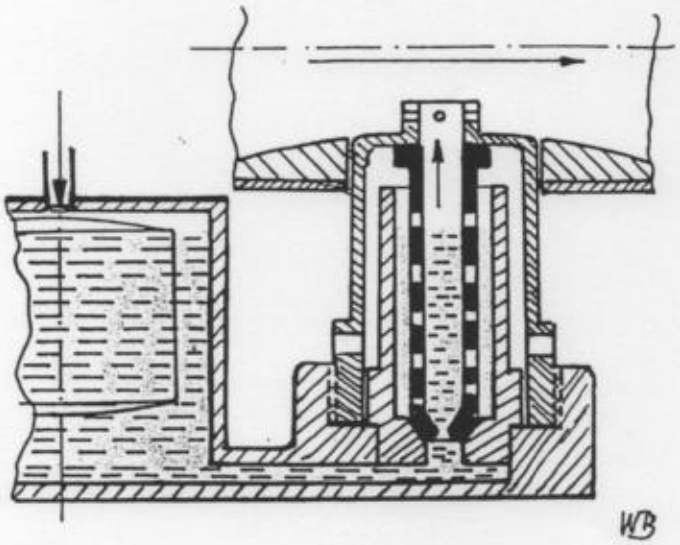

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Fig. 33
Main Jet System (Diagrammatic)

The main jet also functions as an emulsion tube having in its bottom end a calibrated hole for metering the fuel flow. In its wall it has a number of accurately proportioned cross drillings. The main jet is inserted coned end downwards into the coned seating in the jet block and is clamped in position by screwing on the jet cap. The jet cap forms a cylindrical shell around the jet block. The top end of the cap has a chimney-like extension projecting into the mixing chamber, whilst the bottom end has a number of lateral holes for the entry of bleed air.

Fuel flows out the float chamber through the calibrated hole communicating with the main jet cavity and thence through the cross drillings into the annular space of the jet block until it has assumed the same level as in the float chamber.

Under part load conditions, that is to say at the lower end of the speed range, the fuel level remains constant in height, since the fuel drawn off is immediately balanced by the inflow through the main jet orifice. When the throttle butterfly is opened farther, the rise in speed causes a more intense depression to act on the main jet. Fuel is now drawn off at a faster rate than it is replenished. The fuel level in the jet block and in the main jet drops so that the uppermost holes in the main jet are uncovered and allow ingress of extra air to boost the primary air supply (for mixture-weakening purposes) and to act as a check on fuel flow (bleed air).

With the throttle butterfly opened still farther, the fuel level drops again so that more holes in the main jet are uncovered to admit still more compensating and bleed air.

By using the right number of holes of the right size it is arranged that the engine is automatically supplied with the "correct" fuel/air mixture to meet any speed conditions. Details of carburetter settings and of fuel level heights for the various types are given in the Table of Carburetter Settings.

Air Cleaners and Intake Silencers for Vehicles fitted with SOLEX BFLH 30 Horizontal Carburetter

1. The type of air cleaner to be used on Types F 7 / F 8 and F 10 three-speed fitted with BFLH 30 horizontal carburetter, Part. No. 1817 172 01 01 000, is the Knecht unit with filter element, Part No. 1817 178 01 01 000, having element Part No. 1817 173 03 10 000, as shown in Fig. 34.

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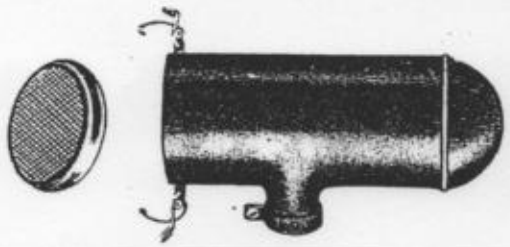

Fig. 34

Knecht Air Cleaner with Element Part No. 1817 173 01 01 000

The 700 c.c. pickup F 89 L three-speed and four-speed models with BFLH 30 horizontal carburettor, Part No. 1817 172 01 01 000, is likewise intended to use the Knecht air cleaner with element, Part No. 1817 173 01 01 000, as shown in Fig. 34.

2. The 700 c.c. Commercial Van three-speed and four-speed models (post van) fitted with BFLH 30 carburetter, Part No. 2031 172 01 01 000, is equipped with an intake silencer with breather tube, Part No. 2031 173 01 01 000 (Mann & Hummel). On this type of intake silencer, as shown in Fig. 35, the breather tube is adjustable to summer and winter positions (see Fig. 45).

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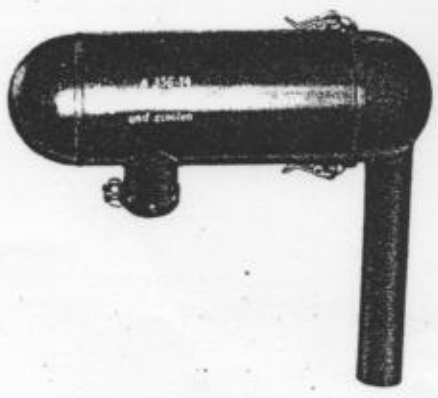


Fig. 35

Intake Silencer with Breather Tube Part No. 2031 173 01 01 000 (Mann & Hummel)

In working principle this carburetter is identical with the models described previously. Whilst retaining the disc valve device, the starter unit differs from the BFLH 30 horizontal carburetter in having a **two-stage starter** with three-position control, as follows:

a) Cold starting position

b) Fast-idle position

c) Off position.

In the fast-idle position the primary emulsion is very greatly weakened to allow the engine to be warmed up and the vehicle also to be driven for short distances.

Note

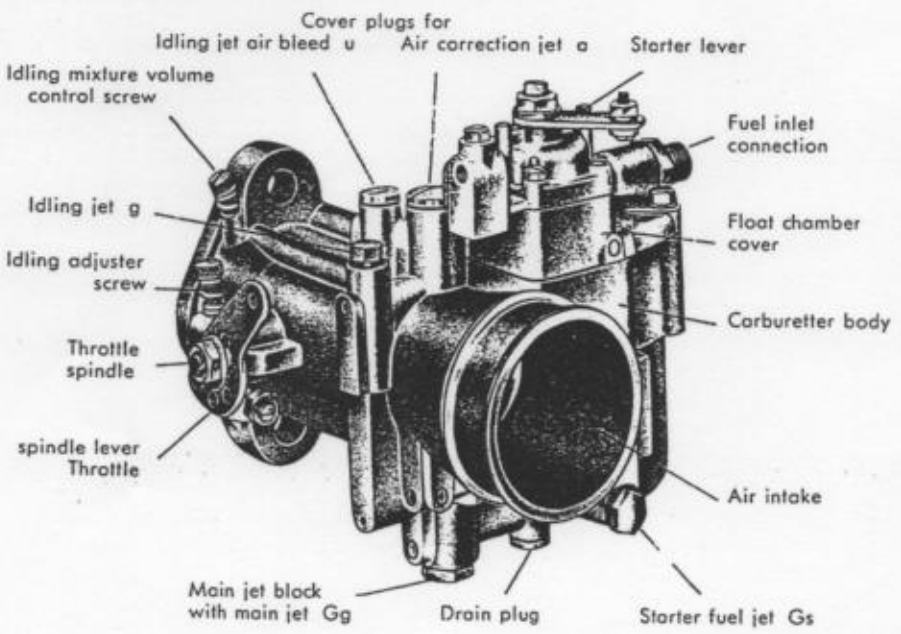
In the fast-idle position the primary emulsion is very greatly weakened to found, for example, on the ICB carburetter.

In the case of the SOLEX 35 HR carburetter, the starter unit must **not be operated at all** if the engine is hot. If difficulty in starting is experienced, the throttle butterfly should be fully opened.

In the part load to full throttle range, compensating air enters through the air correction jet and emulsion tube to counteract any over-enrichment of the mixture.

The working principle of the various units of the carburetter should be sufficiently clear from what has been said previously. The illustrations which follow show the layout of the carburetter and the way the units operate.

Fig. 36 **Type HR Horizontal Carburetter – General View**



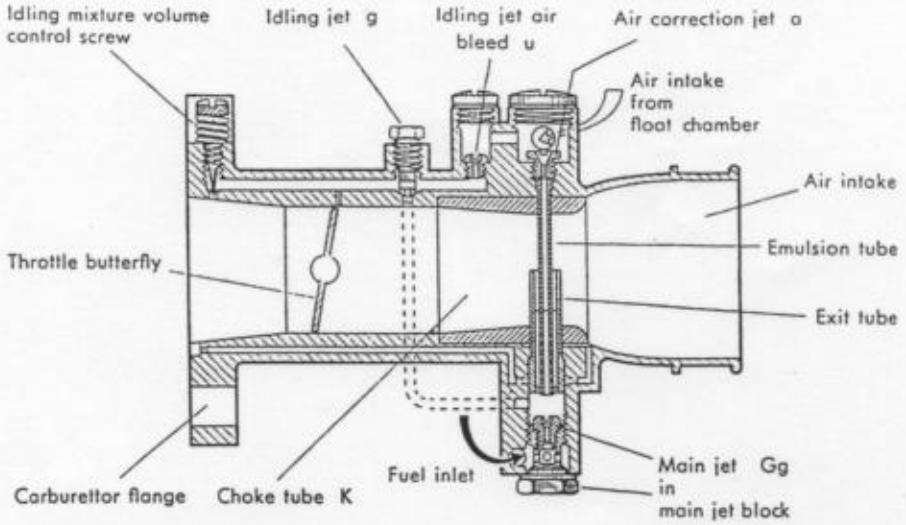


Fig. 37 **HR Downdraught Carburetter – Schematic Section through Bore**

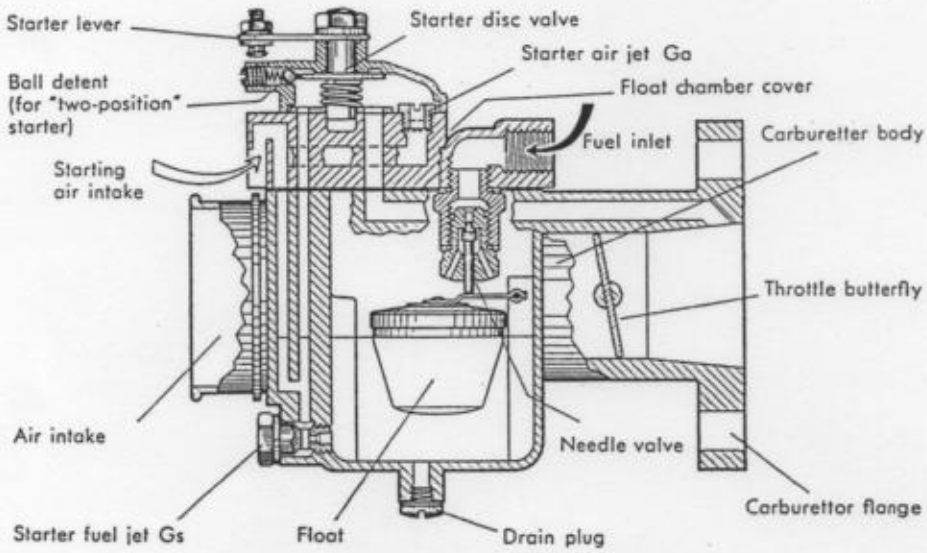


Fig. 38 **HR Downdraught Carburetter – Schematic Section through Float Chamber**

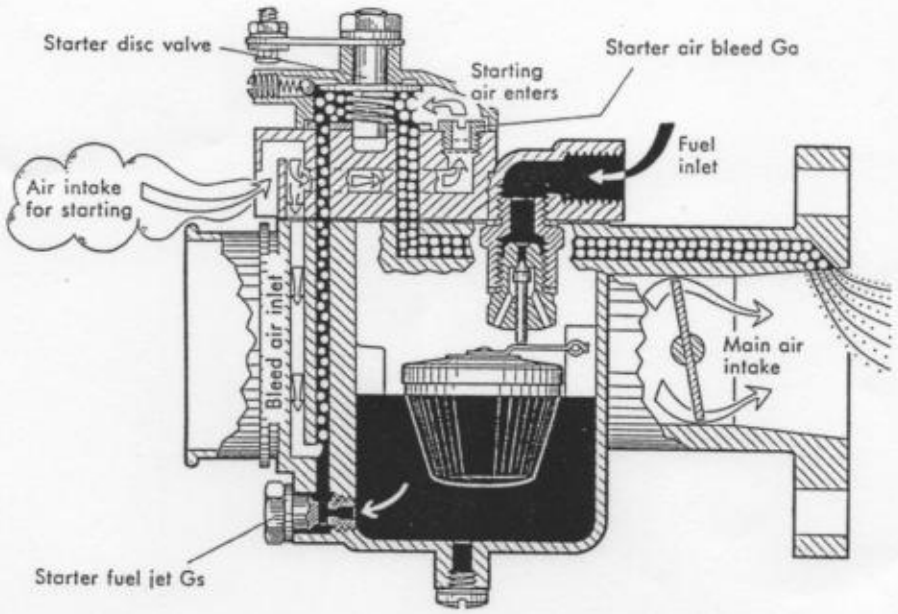


Fig. 39 HR **Downdraught Carburetter – Working Principle of Starter Unit**

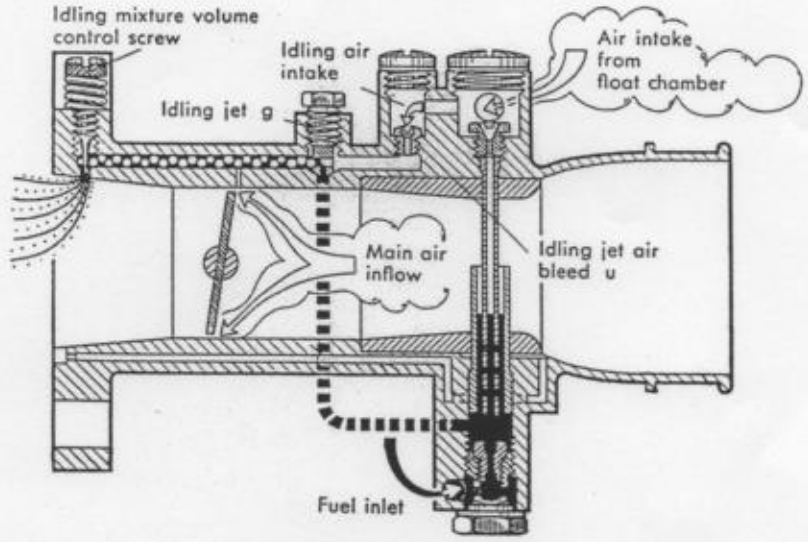


Fig. 40 HR **Downdraught Carburetter – Working Principle of Idling System**

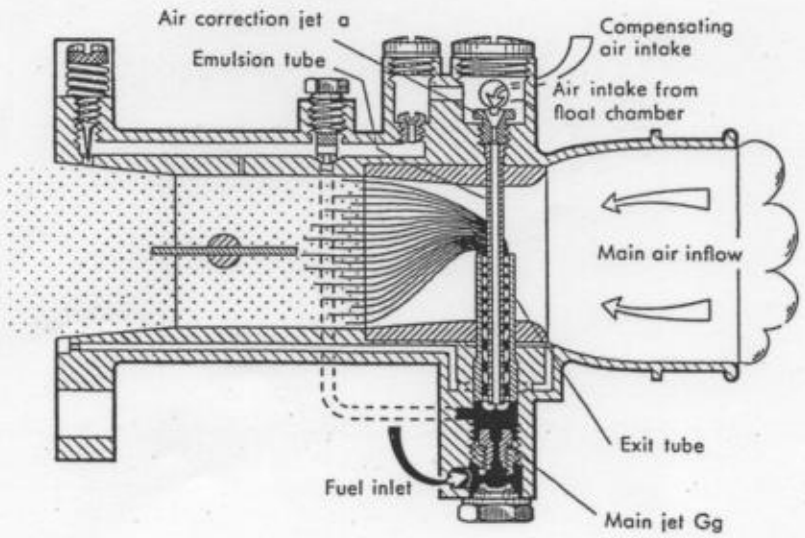


Fig. 41 HR **Downdraught Carburetter – Working Principle at Full Throttle**

Details of carburettor settings and of fuel level heights are given in the Table of Carburetter Settings.

Air Cleaner and Intake Silencer for Type 30 Commercial Van with Solex 35 HR Carburetter

The Type 30 800 c.c. three-speed and four-speed Commercial Van is available only with horizontal carburetter.

a) Carburetter 35 HR, Part No. 2217 172 01 01 000, up to Engine No. 22 001 707 with intake silencer (Mann & Hummel), Part No. 2217 173 1 10 000.

b) Carburetter 35 HR, Part No. 2217 172 01 01 000, with effect from Engine No. 22 001 708 up to 22 005 980 with intake silencer (Mann & Hummel) Part No. 2217 173 01 10 000.

Fig. 42

Intake Silencer with Breather Tube

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Solex 32 PBI Downdraught Carburetter for DKW Meisterklasse with Three-speed Transmission F 89 P (Two-cylinder) Part No. 6003 17201 01 000

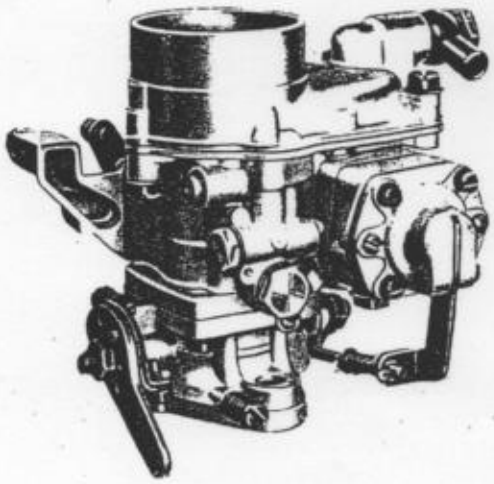

Fig. 43

General View of 32 PBI Downdraught Carburetter

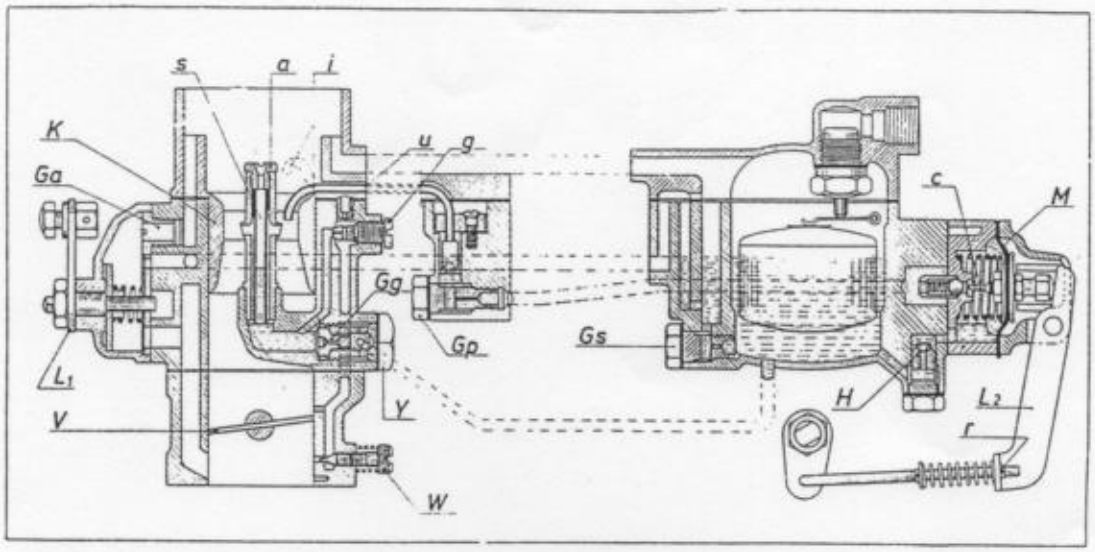

Fig. 43a **32 PBI Downdraught Carburetter shown sectioned**

With effect from Engine No. **60 010 001** up to Engine No. **60 014 869**, the DKW Meisterklasse has been equipped with the Solex Type 32 PBI downdraught carburetter with accelerating pump.

With this type of carburetter, however, it is advisable either to cut the pump jet out of action by fitting a dummy jet, or to remove the accelerating pump. Carburettor settings should be made as for Type 32 BI (minus pump).

The intake silencer with breather tube, Part No. 6003 173 01 10 000, can be adjusted to summer and winter positions.

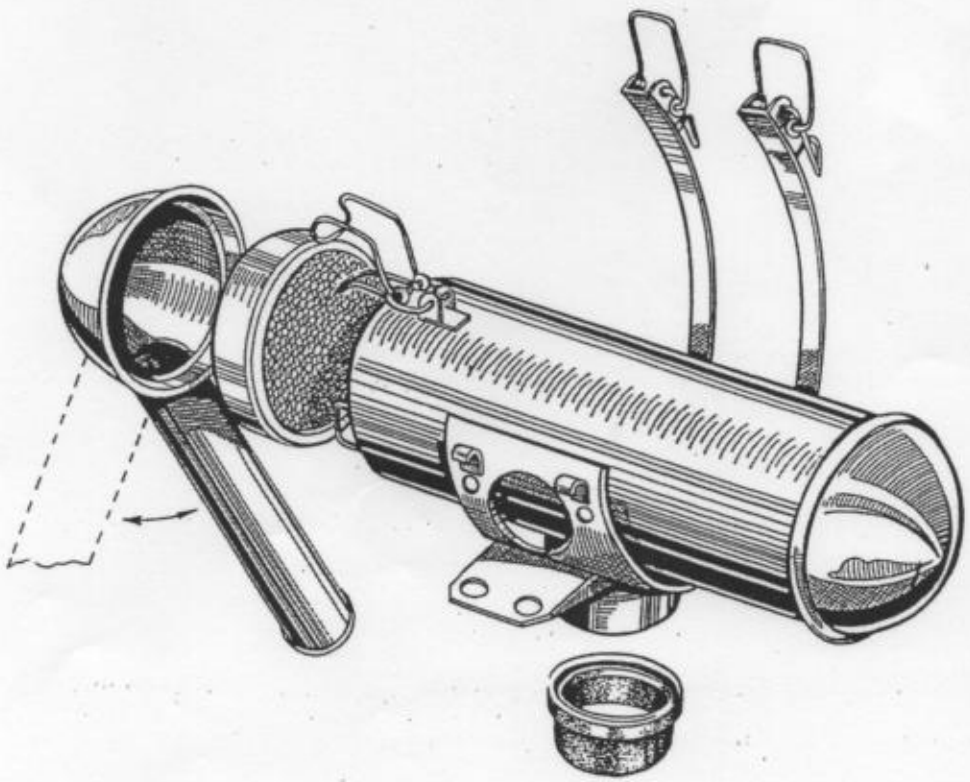

Fig. 43b **Intake Silencer with Breather Tube**

Solex 32 BI Downdraught Carburetter for DKW Meisterklasse with Three-speed Transmission F 89 P (Two-cylinder) Internally Vented Part No. 6003 172 01 01 000

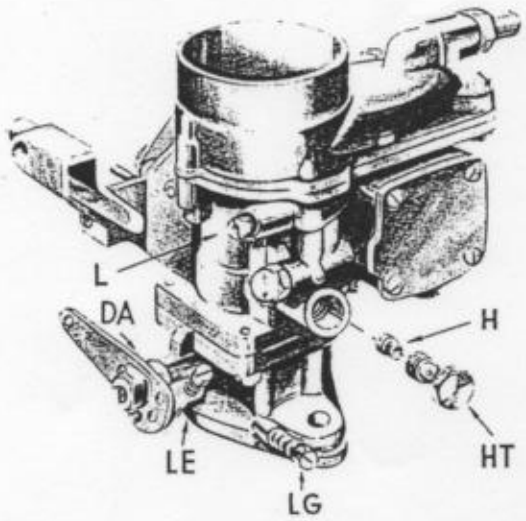

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Fig. 44

Solex 32 BI Downdraught Carburetter

H = Main jet
L = Idling jet
DA = Throttle stop
LE = Idling adjuster screw
LG = Idling mixture volume control screw
HT = Main jet holder

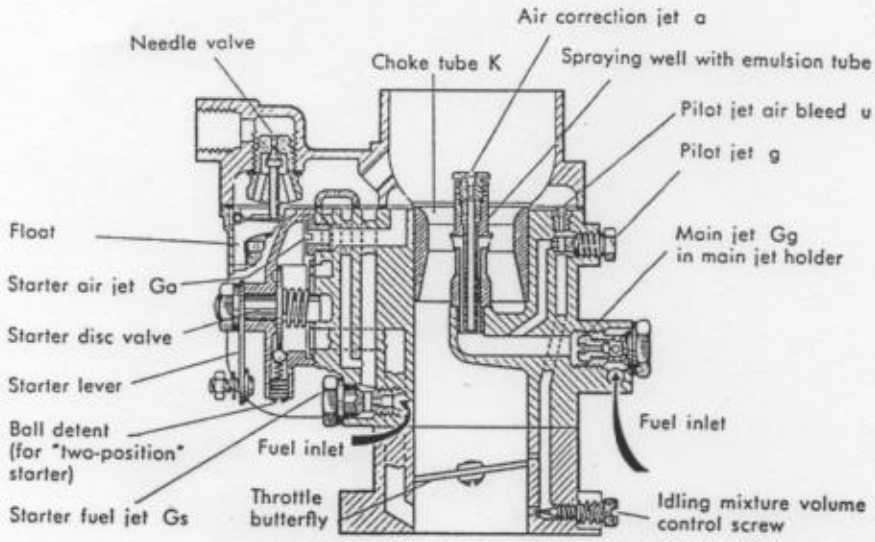


Fig. 44a **32 BI Downdraught Carburetter in section**

DKW Meisterklasse vehicles with effect from Engine No. **60 014 870** and with effect from Engine No. **62 052 448** up to Engine No. **62 052 843** for four-speed are equipped with the Solex downdraught carburetter Type 32 BI (minus pump). Float chamber venting is effected via the air cleaner **(internal venting).**

This carburetter is provided with a **two-position** starter (on similar lines to the Type 35 HR Solex). This carburetter ensures easy starting from cold and also makes for satisfactory idling when cold. Provided that the engine has not attained its normal working temperature, one or other of the starter positions can be used, as follows:

a) Fully opened for cold starting – this gives a rich mixture for efficient starting at the lowest temperatures.

b) Half-opened (position indicated by a click) – giving a weaker mixture. This position is used when starting an engine which has **not cooled down completely.**

Carburettor Settings for Solex Type 32 BI

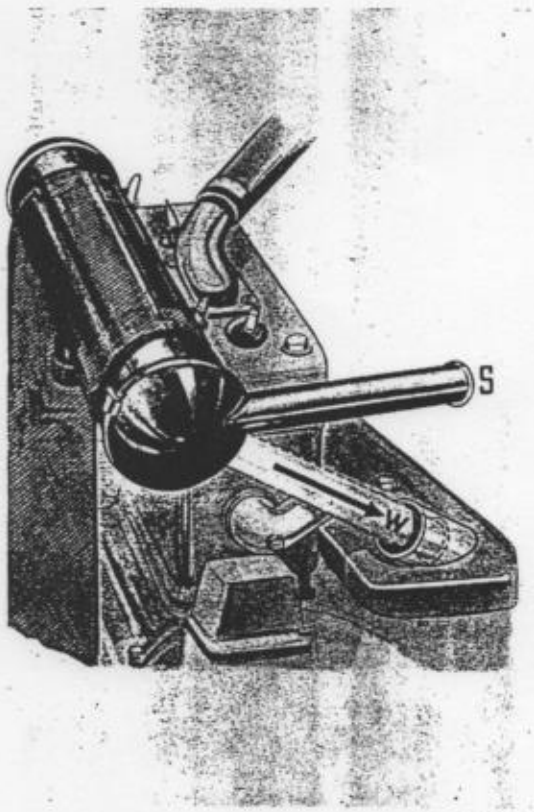
Choke tube	27
Main jet	139 or 140
Air correction jet	250
Idling jet	45
Emulsion tube	20
Starter fuel jet Gs	145
Idling jet air bleed	0.8
Starter air jet	3.5
Needle valve	1.5

Intake Silencer (Air Cleaner) with Breather Tube

The 32 BI carburetter for DKW Meisterklasse F 89 P should be used with the intake silencer with breather tube, Part No. 6003 173 01 10 000. This air cleaner is adjustable for summer and winter conditions.

Fig. 45

Intake Silencer with Breather Tube



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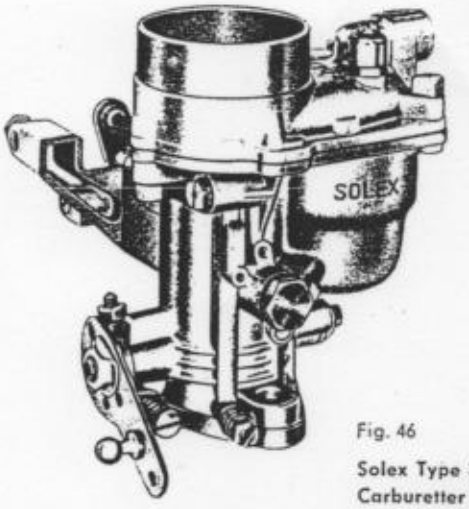

Fig. 46
Solex Type 32 BIC Downdraught Carburetter – externally vented

Carburetter Settings

Choke tube	27
Main jet	0127.5
Air correction jet	260
Idling jet	g 45
Emulsion tube	20
Starter fuel jet	160
Idling jet air bleed	0.8
Starter air jet	3.5
Needle valve	1.5 spec.

Intake silencer, Part No. 6003 173 01 10 000, as for 32 BI.

The Type 32 BIC externally vented downdraught carburetter illustrated in Fig. 47 has been fitted as follows:

a) F 89 P 700 c.c. two-cylinder three-speed and four-speed equipped with 32 BIC externally vented downdraught carburetter, Part No. 6203 172 01 10 000, with effect from Engine No. 62 052 844 up to Engine No. 62 057 130, plus intake silencer with breather tube, Part No. 603 173 01 10 000.

b) F 89 P 700 c.c. two-cylinder three-speed and four-speed equipped with 32 BIC externally vented downdraught carburetter, Part No. 6203 172 01 02 000, with effect from Engine No. 62 057 131, plus intake silencer with breather tube, Part No. 6003 173 01 10 000.

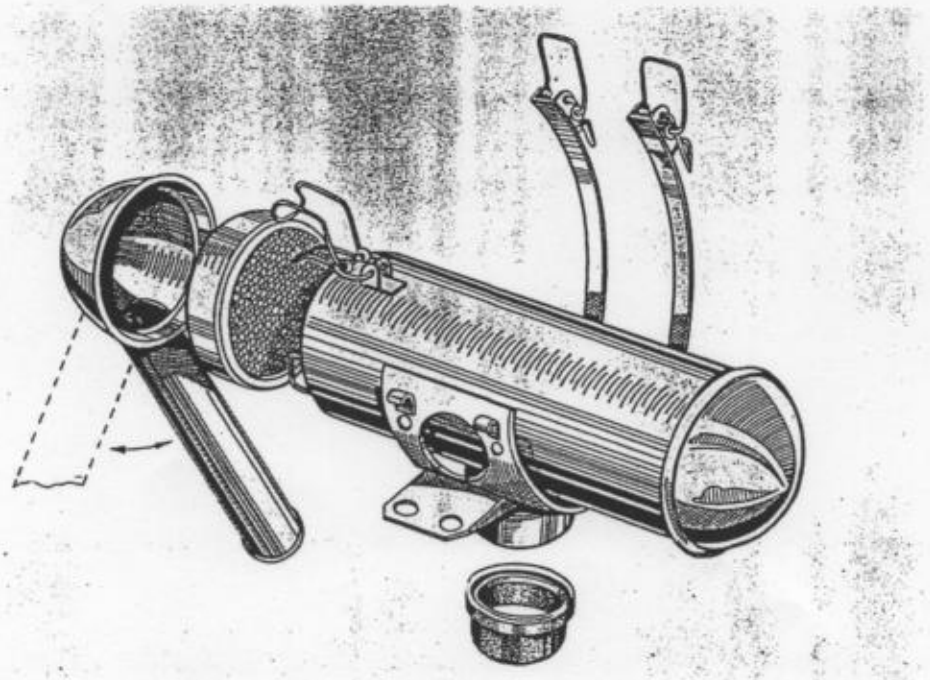

Fig. 47 **Intake Silencer with Air Cleaner complete, Part No. 6003-17301-01/10 (with summer and winter positions)**

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The initial works setting of the carburetter should preferably not be altered if the vehicle is operating under normal conditions, that is to say under approximately the same altitude conditions as at Düsseldorf and Ingolstadt, namely about 985 ft. (300 m) above sea level.

The accompanying Table gives details of carburettor components required for operation in tropical and northern countries.

The following points should be noted in connection with carburetter tuning and operation:

a) **Starting**

1. If engine is cold, pull starter knob on dash right out (past the click position).
2. When starting from cold, keep the throttle shut; therefore, take foot off accelerator pedal!
3. After engine has warmed up adequately, push the starter knob **right back.**
4. If engine is warm, do not use the starter device; instead, open the throttle slightly.
5. If engine is hot (applies only to 40 ICB and 32 NDIX), pull the starter knob out to the half-way position (click position).

b) **Idling**

1. Before tuning the idling system, first check the sparking plugs, clean as necessary, and set specified gap (approx. 0.020–0.024 in. (0.5–0.6 mm) according to vehicle type).
2. Allow engine to warm up and then switch off again.
3. Screw in the idling adjuster screw slightly to give a small increase in speed.
4. Screw the idling mixture volume control screw (both screws on NDIX) in to the full extent, and then back off again about 4–5 half-turns.
5. Start the engine and let it run for a short time. Then screw the idling mixture volume control screw out until engine speed picks up slightly. Next, screw the volume control screw in again until the engine runs evenly.

   (On no account screw the volume control screw right in!)

   Even a small adjustment of the volume control screw makes itself apparent either in unsteady idling or in unduly high idling speed.

   (With NDIX care must be taken to ensure that **both** screws are adjusted by an equal amount).
6. Use the idling adjuster screw to set the idling speed to about 600–700 r.p.m.
7. If satisfactory idling performance cannot be obtained by the above procedure, try cleaning the pilot jet, or, in exceptional cases, fitting a larger or smaller pilot jet.

c) **Normal Running**

1. The main jet, air correction jet and choke tube are initially so matched together that good performance is obtained in return for a reasonable fuel consumption. If the original works settings are changed for any reason, the following points should be borne in mind if any change of jet size is contemplated:

2. Air correction jet made smaller	Peak output higher Fuel consumption higher
3. Air correction jet made larger	Fuel consumption lower Peak output lower
4. Main jet made smaller	Fuel consumption lower Power output reduced
5. Main jet made larger	Power output increased Fuel consumption higher

6. A carburetter adjusted to give an unduly weak mixture is often the cause of engine overheating with consequent risk of damage to motion parts.

d) **Fitting the Carburetter**

The nuts securing the carburettor flange to the induction manifold must be tightened evenly on alternate sides. The throttle control linkage must not exhibit any play or tension when fitted. Care must be taken to ensure that the throttle butterfly opens and closes completely.

Avoid sharp kinks when fitting the starter control cable. The control should be fixed in such a way that in the off position the starter knob is about 0,118 in. (3 mm) clear of the dash.

e) **Dismantling the Carburetter**

Complete dismantling of the carburetter and its removal from the induction manifold are only necessary if the float chamber and butterfly assembly are to be taken down. When refitting, the flange gaskets must be renewed without fail.

On all carburetters – except NDIX – the starter fuel jet, pilot jet and main jet are accessible **externally** for removal and changing, if necessary.

On NDIX carburetters, only the starter fuel jet is accessible **externally** for removal. To clean the main jets and pilot jets it is necessary to unscrew cover "k" (see Fig. 19).

After lifting off the float chamber cover, there can be removed, in the case of the ICB carburetter, the air correction jet, emulsion tube, pilot jet air bleed, choke tube and needle valve, and in the case of NDIX carburetters, the air correction jets and emulsion tubes, pilot jet air bleeds, spraying wells plus pre-atomizers, choke tubes and dual float plus suspension assembly, as well as the needle valve from the float chamber cover.

As mentioned previously, the original settings specified for the carburetter, on the basis of trials carried out by the makers, aim at securing optimum performance combined with maximum economy in fuel consumption.

For the majority of older vehicles and for all vehicles from more recent production there is laid down a standard consumption figure, and by re-checking this figure it is possible to tell, broadly speaking, whether the carburetter and its settings are satisfactory. Hence the need for fuel consumption testing.

The **standard fuel consumption,** which is defined in DIN 70 030, must be ascertained in the manner described below:

1. The road must be dry and level; gradients, either up or down, must not exceed 1.5 %.
2. Test runs are to be made in opposite directions over a route 6,0 miles (10 km) long; the second run is to follow immediately after the first.
3. The vehicle is to be loaded at normal working temperature with half its authorized payload.
4. The vehicle is to be driven at 75 % of its maximum speed but shall not exceed 68 m.p.h. (110 km/h).
5. The test runs are to be carried out in dry weather only, at temperatures between (10° and 30° C) 50° F and 86° F, the wind strength being not in excess of 110 ft./sec. (3 m/sec) and the atmospheric pressure between 760 and 745 mm mercury.
6. To the consumption figure as measured – obtained on commercial grade fuel only – should be added a safety factor of about 10 %.

   The instrument recommended by us the purposes of this test is the DKW Unifix Fuel Consumption Meter shown in Fig. 48. This instrument is suitable not only for consumption tests on DKW Auto Union vehicles, but also has an almost universal range of application covering practically all makes of vehicle.

   Vehicles with gravity-fed carburetters must use the pump version of the meter when carrying out fuel consumption measurements.

60 / 5091a

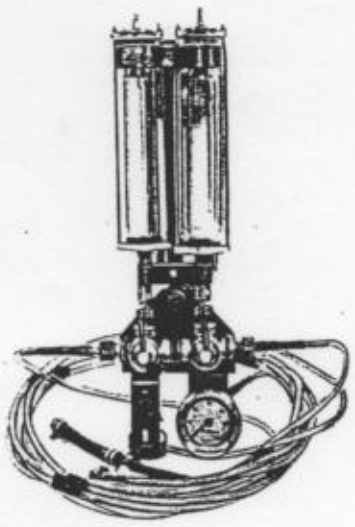
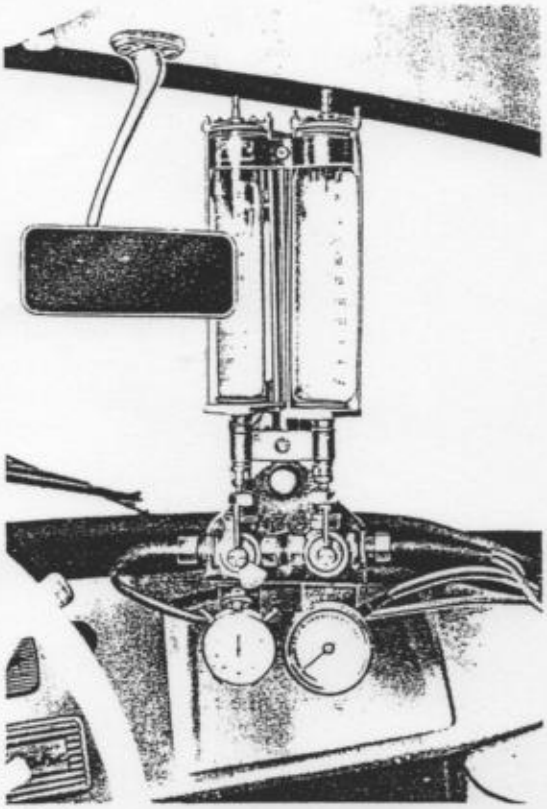


Fig. 48

DKW Unifix Fuel Consumption Meter
(For full description see Vol. 8 of Instruction Manual)

The DKW Unifix has two metering containers, for the preliminary run and for measuring purposes. Fuel pump pressure can be read on the scavenge pressure gauge. The three-way valve is provided with a cam for starting and stopping a stop watch, if used. The meter attaches by rubber suckers to the windscreen and has adjustment features and ball-and-socket joints enabling it to be mounted on straight as well as curved screens so that it is upright and perfectly visible and observable at all times.



60 5365

Fig. 49

Meter in position in AUTO UNION 1000/60

60 5372

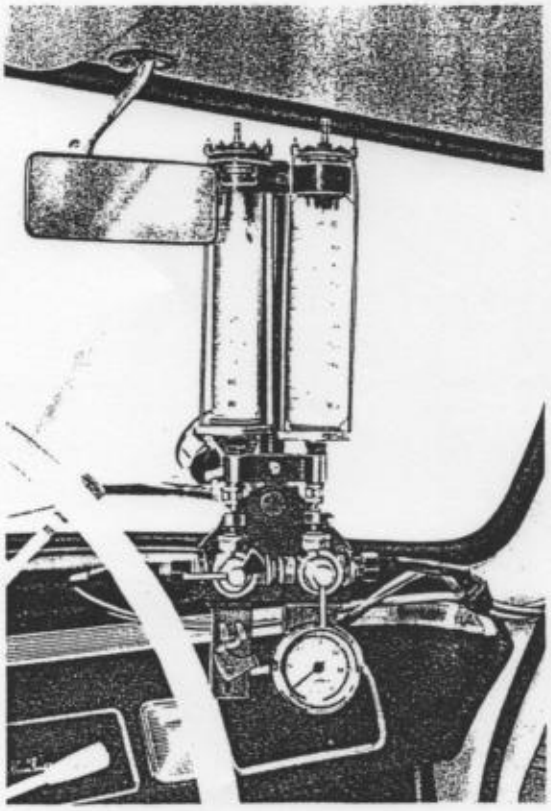


Fig. 50

Meter in position in DKW Junior

Notes on Ignition Timing Tables Sheets 1 and 2 for AUTO UNION DKW Vehicles

Checking of the flyweight for the purpose of setting the ignition timing in accordance with the data in the above Table should be carried out as described below by using the set of gauging pins shown in Fig. 51.

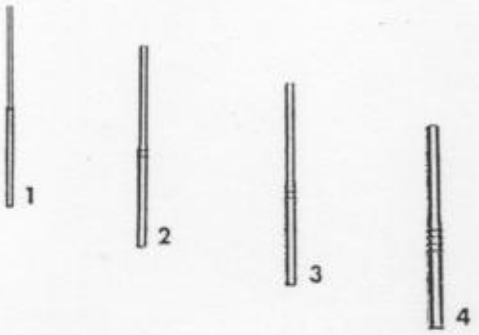


Fig. 51 **Gauging Pins Nos 1 to 4 for Checking Flyweight** 60 5075

Fig. 52 **Checking Distance "d"** 60 4501

The set of gauging pins (Fig. 51) comprises the four items detailed below:

Gauging Pin No	No. of Grooves	Gauging Pin dia. Large in.	Gauging Pin dia. Small in.	Distance "d" in.	Part No. of Gauging Pin
1	1	0.092 (2.35 mm)	0.067 (1.7 mm)	0.09 –0.024 (2.3–06 mm)	8861 313 14 02 018
2	2	0.132 (3.35 mm)	0.106 (2.7 mm)	0.13 –0.024 (3.3–06 mm)	8861 313 14 01 018
3	3	0.140 (3.55 mm)	0.115 (2.9 mm)	0.138–0.024 (3.5–06 mm)	8861 313 14 03 018
4	4	0.180 (4.55 mm)	0.155 (3.9 mm)	0.177–0.024 (4.5–06 mm)	8861 313 14 00 018

Since with correctly adjusted ignition advance the right amount of retardation is obtained automatically, it is necessary when checking the flyweight to use the appropriate size of gauging pin as listed above.

If distance "d" is found to be outside the limits indicated, the wear which has occurred will necessitate changing the flyweight and possibly the V-belt pulley also.

The method of checking distance "d" is as follows:

1. Unscrew the ignition housing – **do not detach any cables.**
2. Introduce the thin end of the appropriate gauging pin (selected from Table) in the arrowed direction (see Fig. 52) between the side of the recess in the V-belt pulley and the flyweight. If it is found that the pin cannot be inserted, this means that the distance is **below** the figure specified for the model in question. The flyweight is **defective** and must be replaced by a new one.
3. Introduce the thick end of the gauging pin in the same manner as indicated in Fig. 52. In this case, however, it should **not** be possible to slide it between the above-mentioned parts. If it is found to be possible, this indicates that the distance **exceeds** the figure laid down in the Table for the model in question. In this case the flyweight should be changed and possibly the V-belt pulley also.

Table of Carburetter Settings (Solex) for Type 40 ICB Downdraught Carburetter (Externally Vented)

Set-up No.	Vehicle Model Type	Carburettor Type	Choke Tube	Main Jet	Air Correction Jet	Emulsion Tube	Idling Jet	Idling Jet Air Bleed	Starter Fuel Jet	Weight of Float in gr.	Needle Valve	Volume Control Screw (Half-turns)	Starter Air Jet	Height of Fuel in Float Chamber in mm. **	Height of Fuel as Measured by Level Tester in mm.	Engine No. from ..... to	Intake Silencer Air Cleaner Part No. and/or Type or Manufacturer	Remarks Modifications
1	F 91 3-speed Sonderklasse	ICB 40	29	0135	170	0	g 50	1,2	160	21 7,3	2 1,5	3—4	3,5	21—23	37—40	from 64001867	Air cleaner with excluder cap Part No. 6403 173 01 06 000 or 6403 173 01 10 000 6403 173 01 12 000	1953 to 1955
2	Large DKW 3=6 F 93/94	ICB 40	29	0135	260	2	g 50	1,5	160	7,3	1,5	3—4	3,5	21—23	37—40	to 66152999	Air cleaner Part No. 6403 173 10 06 000	1955 to 1956
3	Large DKW 3=6 F 93/94	ICB 40	29	0127,5	150	46	g 55	1,5	160	7,3	1,5	3—4	3,5	21—23	37—40	from 66153000	Air cleaner with breather tube Part No. 6403 173 01 06 000 Fa. Knecht, -12 Fa. Mann & Hummel	optional 1957 to 1959
4	AU 1000 and AU 1000/60	ICB 40	30	0132,5	150	46	g 55	1,5	160	7,3	1,5	3—4	3,5	21—23	37—40	from 8861 000001	Air cleaner with breather tube as for 3	1957 to 1959/60
5	AU 1000 S 50 H.P.	ICB 40	32	0140	110	46	g 55	1,5	160	7,3	1,5	3—4	3,5	21—23	37—40	from 8861 043001 06	Either 8861 460 58 00 000 silencer with 8861 460 52 00 000 air cleaner (Mann & Hummel) or 8861 460 51 01 000 air cleaner and silencer complete by Fa. Knecht	from 1960
6	DKW Junior F11	ICB 40	26	0105	200	46	g 45	1,5	160	7,3	1,5	3—4	3,5	21—23	37—40	from 8801 000 001	Intake silencer with air cleaner 8801 460 51 00 000	from 1959
7	Commercial Van 3=6	ICB 40	29	0135	260	2/46	g 50	1,5	160	7,3	2	3—4	3,5	21—23	37—40	from 66 400 102	Air cleaner with breather tube Part No. 6403 173 01 06 000	from 1957

Note: ** measured from top edge of float chamber

Table of Carburetter Settings (Solex) for Type 32 NDIX Dual-port Downdraught Carburetter

Set-up No.	Vehicle Model Type	Carburettor Type	Choke Tube	Main Jet	Air Correction Jet	Emulsion Tube	Idling Jet	Idling Jet Air Bleed	Starter Fuel Jet	Weight of Float in gr. including Suspension	Needle Valve	Volume Control Screw (Half-turns)	Starter Air Jet	Height of Fuel in Float Chamber in mm. **	Height of Fuel as Measured by Level Tester in mm.	Engine No. from ..... to	Intake Silencer Air Cleaner Part No. and/or Type or Manufacturer	Remarks Modifications
	Number =		2x	2x	2x	2x	2x	2x	1x		1x	2x		mm	mm			
1	F 91 4 and 6 Cross-Country Car 900	NDIX 32	23	105	140	4 s	45	160	160	30	2,0	4—5		** 17—19		66308361 66308608	Oil bath air cleaner Part No. 3035 173 02 00 000	Up to Chassis No. 30 507 322/ 3036 000 100
2	F 91 4 and 6 Cross-Country Car 900	NDIX 32	23	110	140	4 s	45	160	160	30	2,0	4—5		** 17—19		66308586 66309186	Oil bath air cleaner with cyclone silencer Part No. 3035 173 02 20 000	from Chassis No. 30 507 323/ 3036 000 101
3	F 91/1000 Cross-Country Car	NDIX 32	23	112	110	4 s	45	160	160	30	2,0	4—5		** 17—19		8862000644 8862000967	Oil bath air cleaner with cyclone silencer Part No. 3035 173 02 20 000	from Chassis No. 3038/3039 000 001
4	AU 1000 Sp	NDIX 32	24	115	120	3 n	50	160	220	30	2,0	4—5		** 17—19			Air cleaner with element Part No. 8861 460 51 00 000	Up to Chassis No. 6815 001 020
5	AU 1000 Sp 59/60	NDIX 32	25	112	140	3 n	50	160	220	30	2,0	4—5		** 17—19			Air cleaner with pre-cleaner constisting of Intake silencer, Part No. 8861 460 52 03 000, and elbow, Part No. 8861 460 58 02 000	from Chassis No. 6815 001 021

Note: No. 2 and 3 = NDIX internally vented
No. 4 and 5 = NDIX externally vented

** measured from top edge of float chamber

Table of Carburetter Settings (Solex) for Types: **32 BI Downdraught Carburetter** **35 HR Horizontal Carburetter**
32 PBI Downdraught Carburetter with Accelerating Pump **32 BIC Downdraught Carburetter** **40 BIC Horizontal Carburetter, internally vented**

Set-up No.	Vehicle Model Type	Carburettor Type	Choke Tube	Main Jet	Air Correction Jet	Emulsion Tube	Idling Jet	Idling Jet Air Bleed	Starter Fuel Jet	Weight of Float in gr.	Needle Valve	Volume Control Screw (Half-turns)	Starter Air Jet	Height of Fuel in Float Chamber in mm. **	Height of Fuel as Measured by Level Tester in mm.	Engine No. from ..... to	Intake Silencer Air Cleaner Part No. and/or Type or Manufacturer	Remarks Modifications
1	Meisterklasse F 89 P	PBI 32	26 27	130 140	240 250	17 20	g 45	0,8	160	12,5	1,5	3—4	3,5	** 18—20	25—27	60010001 60014869	With breather tube S+W Part No. 6003 173 01 10 000	Three-speed ***
2	Meisterklasse F 89 P	BI 32	27	140	250	20	g 45	0,8	160	11	1,5	1—3	3,5	** 18—20	25—27	60014870 62052448 up to 62052843	With breather tube S+W Part No. 6003 173 01 10 000	Internally vented Three- and four-speed
3	Meisterklasse F 89 P 3- and 4-speed	BIC 32 Externally vented	27	0127,5	260	20	g 45	0,8	160	11	1,5 spec.	1—3	3,5	** 18—20	25—27	from 62052844 up to 62057130	With breather tube S+W Part No. 6003 173 01 10 000	32 BIC down-draught Part No. 6302-17201-01
4	Typ 30 000 c.c.	35 HR	30	0125	200	—	g 45	1,0	120	12,5 7,3	2,0	1—4	3,5	* 41—43	28—30	from 62057131 up to 22001707	With breather tube S+W Part No. 6003 173 01 10 000 Mann & Hummel Part No. 2217 173 01 10 000	32 BIC down-draught Part No. 6203-17201-02
5	Typ 30 800 cm³	35 HR	30	0125	200	—	g 45	1,0	120	12,5 7,3	2,0	1—4	3,5	* 41—43	28—30	from 22001708	Mann & Hummel Part No. 2217 173 01 10 000	
6	F 91 3-speed	BIC 40	29	0135	130	0	g 50	1,2	160	21	2,0	2—5	3,5	** 21—23	34—36	up to 64001866	Air cleaner with excluder cap Part No. 6403 173 01 06 000 Part No. 6403 173 01 10 000 Part No. 6403 173 01 12 000	from Engine No. 64024350

Note: * height of fuel measured by level tester
**measured from top edge of float chamber
*** pump jet Size 40 should preferably be replaced by a dummy jet and the accelerating pump put out of action

Table of Carburetter Settings (Solex) for Type BFLH 30 Horizontal Carburetter

Set-up No.	Vehicle Model Type	Carburettor Type	Choke Tube	Main Jet	Air Correction Jet	Emulsion Tube	Idling Jet	Idling Jet Air Bleed	Starter Fuel Jet	Weight of Float in gr.	Needle Valve	Volume Control Screw (Half-turns)	Starter Air Jet	Height of Fuel in Float Chamber in mm. **	Height of Fuel as Measured by Level Tester in mm.	Engine No. from ..... to	Intake Silencer Air Cleaner Part No. and/or Type or Manufacturer	Remarks Modifications
1	F 7/F 8/F 10	BFLH 30	23	105x58	—	—	045	—	95	22	2,0	1—3	4	5—6 *	—	–	Knecht air cleaner with element Part No. 1817 173 01 01 000	
2	F 7	BFLH 30	24	107,5	—	—	045	—	95	22	2,0	1—3	4	5—6 *	—	–	Knecht air cleaner with element Part No. 1817 173 01 01 000	For mountainous terrain above 2600 ft. (800 m)
3	F 7	BFLH 30	25	110	—	—	045	—	95	22	2,0	1—3	4	5—6 *	—	–	Knecht air cleaner with element Part No. 1817 173 01 01 000	For luxury coupe and sports vehicles
4	Commercial Van F 89 L	BFLH 30	23	105x58	—	—	050	—	160	22	2,0	1—3	3,5	13—15 **	23—25	–	Knecht air cleaner with element Part No. 1817 173 01 01 000	Up to Chassis No. 20 009 501 (old exhaust assy.)
5	Post Van F 89 L	BFLH 30	28	115x58	—	—	050	—	160	22	2,0	1—3	3,5	13—15 **	23—25	–	Mann & Hummel intake silencer Part No. 2031 173 01 01 000	With breather tube for summer and winter duty *

Note for 1 to 5: Jet cap drilled 6 holes 0.098 in. (2.5 mm) dia. 0.197 in. (5 mm) extension
Jet models 58

* below edge of jet holder
** measured from top edge of float chamber

Table of Jets for 40 ICB Carburetter

Description	Size	Part No.
Main jet	0100	8801 461 60 10 000*
Main jet	0102,5	8801 461 60 11 000*
Main jet	0105	8801 461 60 12 000*
Main jet	0107,5	8801 461 60 13 000
Main jet	0110	8801 461 60 14 000*
Main jet	0115	6003 172 13 16 000
Main jet	0120	6003 172 13 18 000
Main jet	0122,5	6003 172 13 19 000
Main jet	0125	6003 172 13 20 000
Main jet	0127,5	6003 172 13 21 000
Main jet	0130	6003 172 13 22 000
Main jet	0132,5	6003 172 13 23 000
Main jet	0135	6003 172 13 24 000
Main jet	0137,5	6003 172 13 25 000
Main jet	0140	6003 172 13 26 000
Main jet	0145	6003 172 13 28 000
Idling jet	45	8801 461 61 12 000*
Idling jet	50	6003 172 11 14 000
Idling jet	55	6003 172 11 16 000
Choke tube	26	8801 461 20 18 000*
Choke tube	29	6403 172 26 24 000
Choke tube	30	6403 172 26 26 000
Choke tube	32	6403 172 26 30 000
Emulsion tube	S 46	8801 461 69 00 000*
Air correction jet	110	6403 172 14 16 000
Air correction jet	150	6403 172 14 24 000
Air correction jet	170	6403 172 14 28 000
Air correction jet	200	8801 461 72 24 000*
Starter fuel jet	160	8801 461 62 22 000
Idling jet air bleed	1,5	8801 461 71 18 000

Note: * for DKW Junior

Table of Jets for 32 NDIX Carburetter

Description	Size	Part No.
Main jet	102,5	3035 172 13 09 000
Main jet	105	3035 172 13 12 000
Main jet	107,5	3035 172 13 13 000
Main jet	110	3035 172 13 14 000
Main jet	112,5	3035 172 13 15 000
Main jet	115	3035 172 13 16 000
Main jet	117,5	3035 172 13 17 000
Starter fuel jet	130	3035 172 09 12 000
Starter fuel jet	160	3035 172 09 00 000
Choke tube	23	3035 172 26 00 000
Choke tube	24	3035 172 26 02 000
Choke tube	25	3035 172 26 04 000
Choke tube	3n	3035 172 89 10 000
Choke tube	4s	3035 172 89 00 000
Pilot jet	45	3035 172 11 00 000
Pilot jet	50	3035 172 11 02 000
Air correction jet	110	3035 172 14 05 000
Air correction jet	120	3035 172 14 06 000
Air correction jet	140	3035 172 14 14 000

Ignition Timing Table for AUTO UNION DKW Vehicles

(Position as on 11 th November, 1959)

	Timing with Flyweight Thrown Out (advanced) in. before T.D.C.	Distance "d"	Range of Control Start/Finish r.p.m. * (see Remarks)	V-belt Pulley Part No.	Flyweight Part No.	Compression Spring Part No.	Colour
Car Models 58							
F 93/94 (8840/40 H.P.) **	3 (retard 1)	–	1500 2000	6403 367 75 11 000	6403 367 09 10 000	6617 367 12 00 000	–
AUTO UNION 1000 (8861 00 and 01/44 H.P.)	3	4,5 – 0,6	1500 2000	8861 310 26 00 000	8861 313 14 00 000	8861 313 41 00 000	Yellow
AUTO UNION 1000 (8861 00 and 01/44 H.P.) anti-pinking	3	3,3 – 0,6	3000 3200	8861 310 26 00 000	8861 313 14 01 000	8861 313 41 02 000	White
AUTO UNION 1000 Sp (8861 02/55 H.P.)	2,5	2,3 – 0,6	3900 4200	8861 310 26 00 000	8861 313 14 02 000	8861 313 41 03 000	Blue
AUTO UNION 1000 Sp (8861 02/55 H.P.) anti-pinking	2,5	3,5 – 0,6	3800 4200	8861 310 26 00 000	8861 313 14 03 000	8861 313 41 03 000	Blue
Car Models 60							
Junior F 11 (8801/34 H.P.)	2,5	3,5 – 0,6	3200 3500	8801 310 26 01 000	8861 313 14 03 000	8861 313 41 02 000	White
Junior F 11 (8801/34 H.P.) anti-pinking	2,5	3,5 – 0,6	3800 4200	8801 310 26 01 000	8861 313 14 03 000	8861 313 41 03 000	Blue
AUTO UNION 1000 (8861 04 and 05/44 H.P.)	3	4,5 – 0,6	1500 2000	8861 310 26 01 000	8861 313 14 00 000	8861 313 41 00 000	Yellow
AUTO UNION 1000 (8861 04 and 05/44 H.P.) anti-pinking	3	3,3 – 0,6	3000 3200	8861 310 26 01 000	8861 313 14 01 000	8861 313 41 02 000	White
AUTO UNION 1000 S (8861 06 and 07/50 H.P.)	2,5	3,5 – 0,6	2500 3000	8861 310 26 01 000	8861 313 14 03 000	8862 313 41 00 000	Green
AUTO UNION 1000 S (8861 06 and 07/50 H.P.) anti-pinking	2,5	3,5 – 0,6	3800 4200	8861 310 26 01 000	8861 313 14 03 000	8861 313 41 03 000	Blue
AUTO UNION 1000 Sp (8861 08/55 H.P.)	2,5	3,5 – 0,6	3800 4200	8861 310 26 01 000	8861 313 14 03 000	8861 313 41 03 000	Blue
Commercial Van							
F 800/3 (8842 all/900 c.c.) **	3 (retard 1)	–	1500 2000	6403 367 75 11 000	6403 367 09 10 000	6617 367 12 00 000	–

Cross-Country								
8843 all (900 c.c.) up to Eng. No. 6630 9944 **	3,5 (retard 1,85)	–	1500	2000	6403 367 75 11 000	6403 367 09 10 000	6617 367 12 00 000	–
8843 all (900 c.c.) from Eng. No. 6630 9945	3,5	3,3 – 0,6	1500	2000	8861 310 26 00 000	8861 313 14 01 000	6617 367 12 00 000	–
8862 all 1000 c.c.)	3	3,3 – 0,6	2500	3000	8861 310 26 00 000	8861 313 14 01 000	8862 313 41 00 000	Green
8862 all (1000 c.c.) anti-pinking	3	3,3 – 0,6	3000	3200	8861 310 26 00 000	8861 313 14 01 000	8861 313 41 02 000	White

Remarks: * Start and finish should always be checked with the speed increasing. All speed figures may differ by ± 100 r.p.m. from the stated values.

** For repair purposes on these types the following settings can be adopted by replacing the pulley and flyweight:

F 93/94 (8840/40 H.P.)	3	3,3 – 0,6	1500	2000	8861 310 26 00 000	8861 313 14 01 000	6617 367 12 00 000	–
F 800/3 (8842 all/900 c.c.)	3	3,3 – 0,6	1500	2000	8861 310 26 00 000	8861 313 14 01 000	6617 367 12 00 000	–
8843 all (900 c.c.)	3,5	3,3 – 0,6	1500	2000	8861 310 26 00 000	8861 313 14 01 000	6617 367 12 00 000	–

Ignition Timing for Earlier Models

	Ignition Advance in. before T. D. C.
Reichsklasse and Meisterklasse F 2 – F 8 and F 10 (1932 – 1940 and 1949)	0.197 (5 mm)
Commercial Van F 89 L	0.197 – 0.217 (5 – 5.5 mm)
Schnellaster F 89 L (Post)	0.197 – 0.217 (5 – 5.5 mm)
Sonderklasse F 91	0.177 – 0.197 (4.5 – 5 mm)
Commercial Van Type 30 F 800 (with ignition distributor)	0.138 at 3250 r.p.m.
Commercial Van 3=6 F 800/3 (retard 0.039 to 0.060 in. [1.0 – 1.5 mm]) up to Eng. No. 66 152 999	0.157 – 0.177 (4.0 – 4.5 mm)