

The BMW Motorcycle — Carburettors

Documentation for the BMW Service Training School

BMW Motorrad GmbH + Co. Munich
Service Promotion



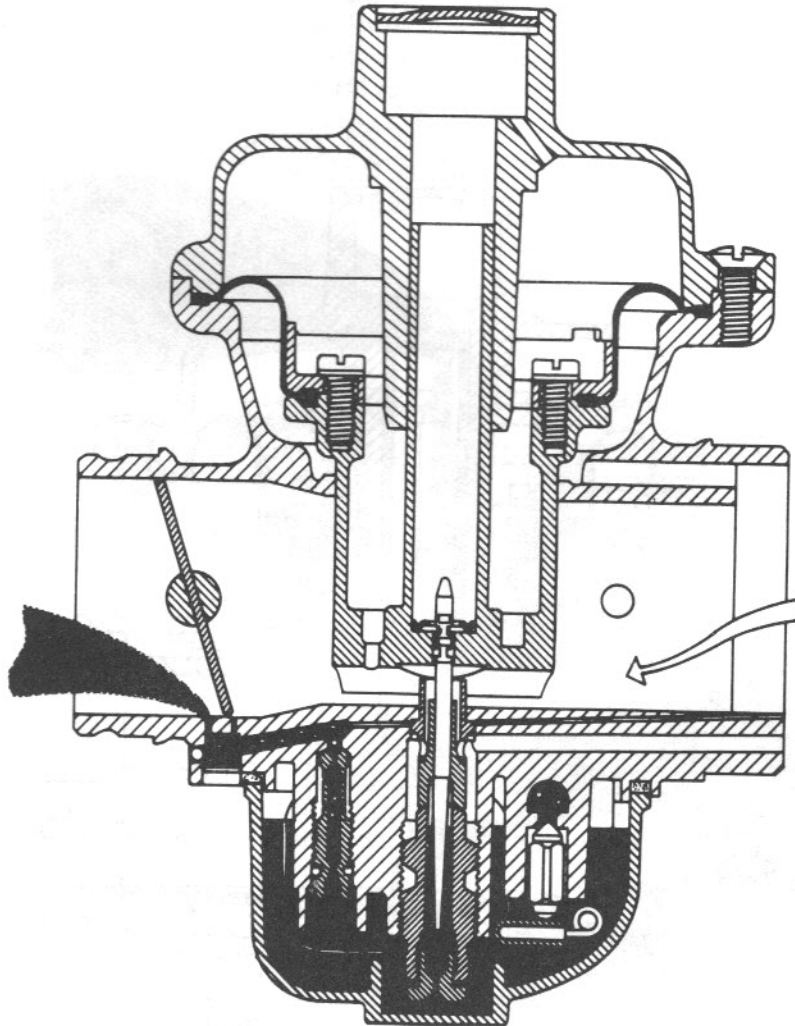
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1.0 Bing V 64/V 94 constant-depression carburetors
Barrel diameter 32/40 mm

1.1 Idle system

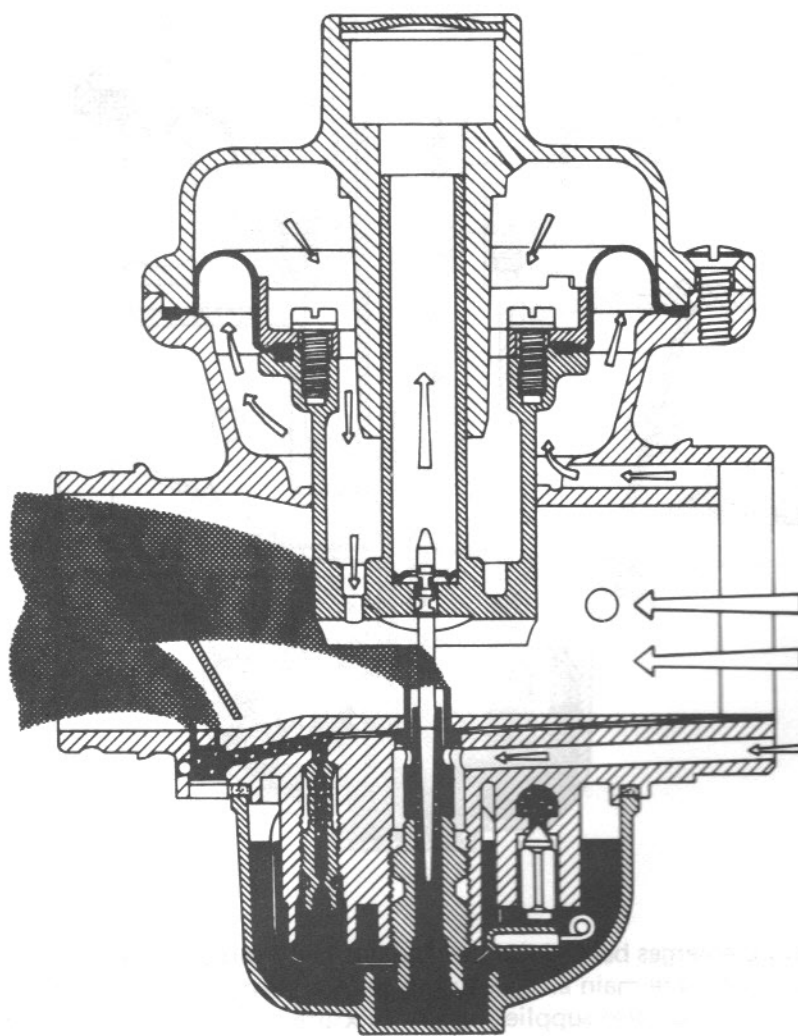
The idle system operates independently of the main jet system. Fuel drawn in through the idle jet is mixed with air from the calibrated idle air passage in the cavity following the idle jet.



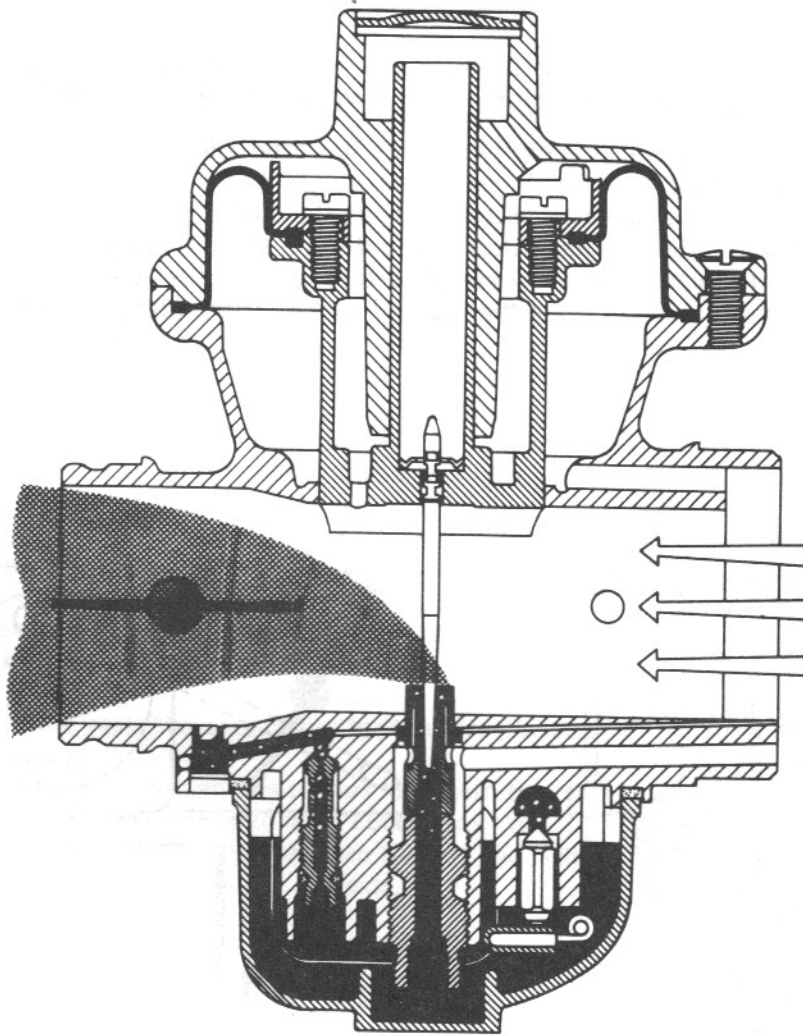
This mixture emerges behind the throttle butterfly through a bore in the air venturi and joins the main airflow drawn in by the engine. A transition or pick-up bore, which also supplies fuel-air mixture to the air venturi, ensures improved pick-up when accelerating away from idle speed at part load.

1.2 Main jet system

From the float housing fuel passes via the main jet, the main jet block and the needle jet to a pre-atomizer, where it is initially mixed with air drawn in through a bore at the air inlet stub pipe. The fuel-air mixture meets the main airflow in the air venturi. The rate of airflow is controlled by the vacuum plunger. When the throttle butterfly is opened and the engine accelerates, the resulting vacuum or intake-side depression, which is limited at idle speed by the throttle butterfly, causes an acceleration in the rate of flow compared with the regular atmospheric pressure now entering. The airflow below the plunger causes a partial vacuum at the two bores in the base of the plunger and this is passed on by means of the plunger diaphragm. At the same time, the atmospheric pressure ahead of the carburettor's inlet tract builds up a certain pressure by way of an aperture terminating below the plunger diaphragm. These two forces raise the plunger continually and smoothly in proportion to engine speed and load, and thus lift the jet needle as well. This ensures that



the optimum fuel-air mixture ratio is maintained over the entire engine speed range. The greater the volume of air drawn in, the higher the amount of upward movement at the plunger. This pulls out the conical jet needle and increases the annular cross-section at the needle jet, so that the flow of fuel is increased in the same proportion. The volume of fuel is controlled or restricted at part load by the needle jet and at full load by the main jet.

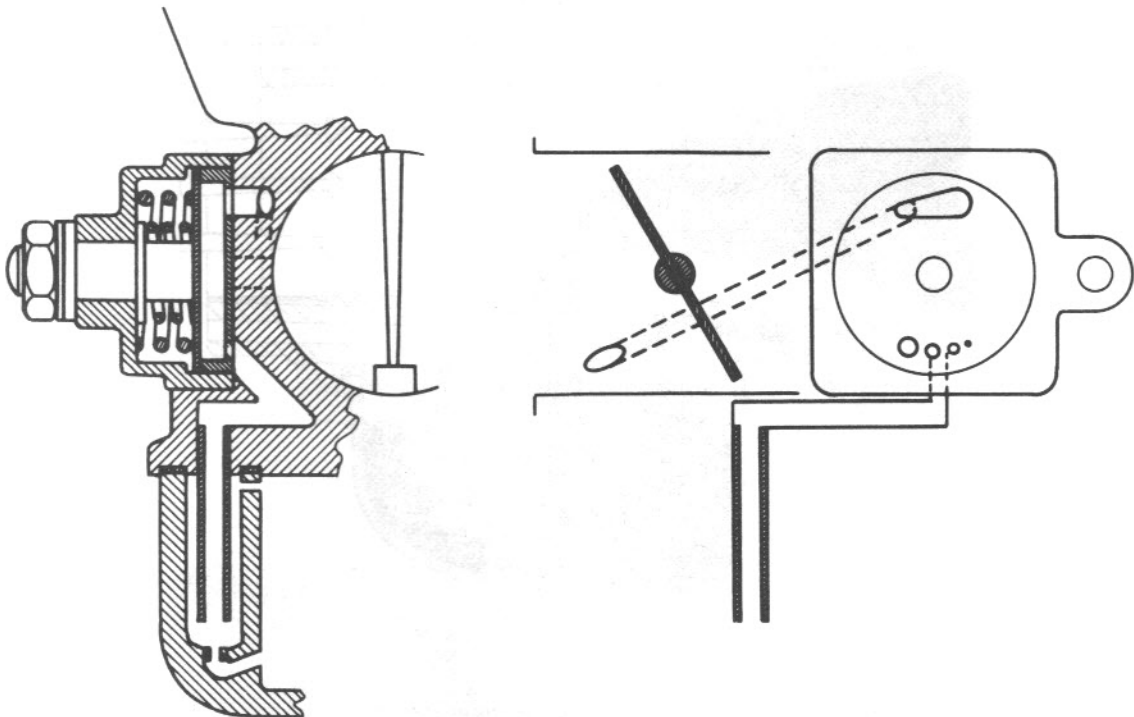


The constant-depression carburettor has no accelerator pump. When acceleration takes place, the throttle butterfly opens beyond its previous position, in which the plunger was raised to a given height by the prevailing pressure and vacuum levels. Opening the throttle increases the partial vacuum in the intake tract suddenly, and has the effect of raising the plunger further. This movement is delayed by the natural inertia of the plunger. As a result, the volume of air needed at that moment is artificially restricted for a short time, but the increase in vacuum takes effect in full at the needle jet and draws in more fuel. This richens the fuel-air mixture and encourages smooth, powerful acceleration.

1.3 Starting device

The starting device on this carburettor is an auxiliary instrument equipped with a rotary disc valve, which operates only during starting and when the engine is cold.

Inside the float chamber, a cavity acts as a fuel reservoir. A tube enters this cavity and is immersed in the fuel. Since the throttle butterfly is almost closed when starting, the resulting partial vacuum acts on the outlet aperture of the starting system behind the throttle butterfly, and thus on the immersed starting tube and the air inlet aperture. The fuel in the starting reservoir then passes through one of the calibrated bores in the rotary disc valve (depending on the setting of



the starting device) into the mixing chamber, where it forms a mixture with the air. This fuel-rich starting emulsion then passes to the main airflow in the air venturi. The mixture is metered by a cutout in the rotary disc valve.

After the engine has started, a pre-emulsion is formed by an air bore in the starting device housing and a fuel volume limiter in the fuel supply. This weakens the starting mixture sufficiently to ensure reliable running of the cold engine.

1.4 Idle adjustment — constant-depression carburettor

Basic setting:

Tighten the idle mixture regulating screw fully, then slacken off by one complete turn. Tighten the throttle stop screw until it just touches the throttle lever, then tighten by one further turn.

Idle adjustment:

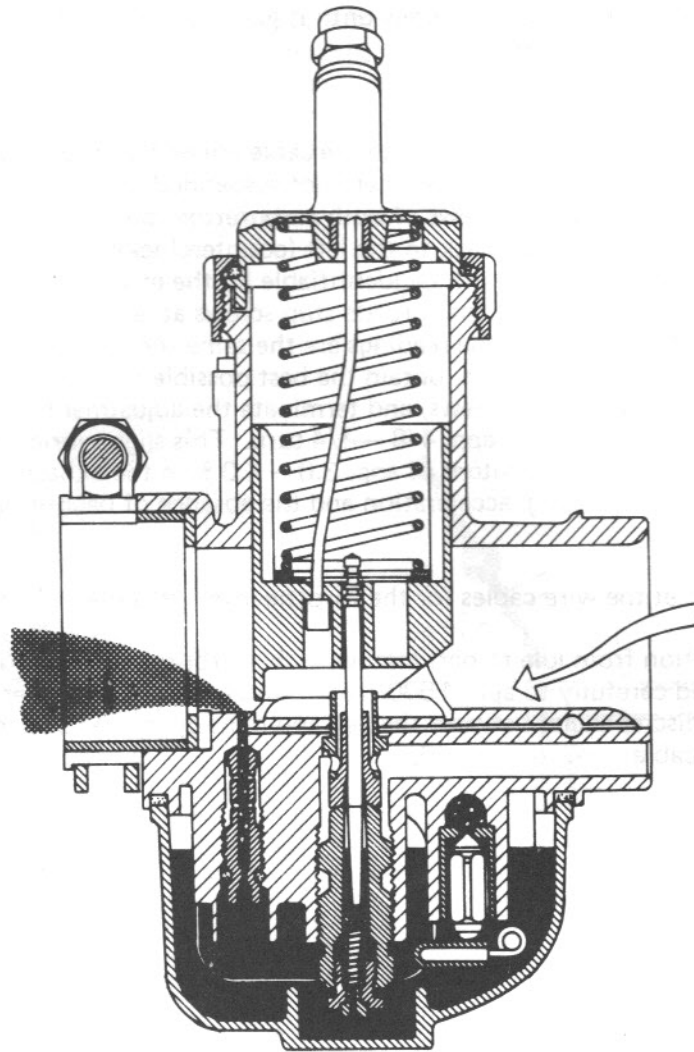
On both carburettors, slacken off the wire cable adjusting screws until about 3 mm play is present and the throttle levers are not suspended from the wire cables. Turn the idle mixture regulating screws of both carburettors carefully and slowly to the right (clockwise), then turn back to the left (counterclockwise) until the best mixture strength is found. This will be identifiable by the engine speed rising as far as possible. Slowly slacken off the throttle stop screws at left and right, watching the synchronizer to ensure that the readings are the same for both cylinders. At an engine speed of app. 1000/min, obtain the best possible mixture strength again with the idle mixture regulating screws, and terminate the adjustment by slackening the mixture screws by a further app. $1/8 - 1/4$ turn. This slight enrichment of the idle mixture yields a CO content of app. 3.0 — 4.0 % in the exhaust, and ensures consistently good starting, acceleration and the absence of backfiring caused by too weak a mixture.

After this, reset the wire cables for the throttle levers to a play of only app. 1.0 mm.

Check transition from idle to part load with the carburettor synchronizer (increase running speed carefully to app. 1500/min). Watch the synchronizer readings: there must be no discrepancies between the left and right cylinders. If necessary, adjust the throttle cable screw on one side.

2.0 Bing V 56 slide-type carburettors

This is a carburettor of 26 mm barrel diameter, with plunger and throttle slide.



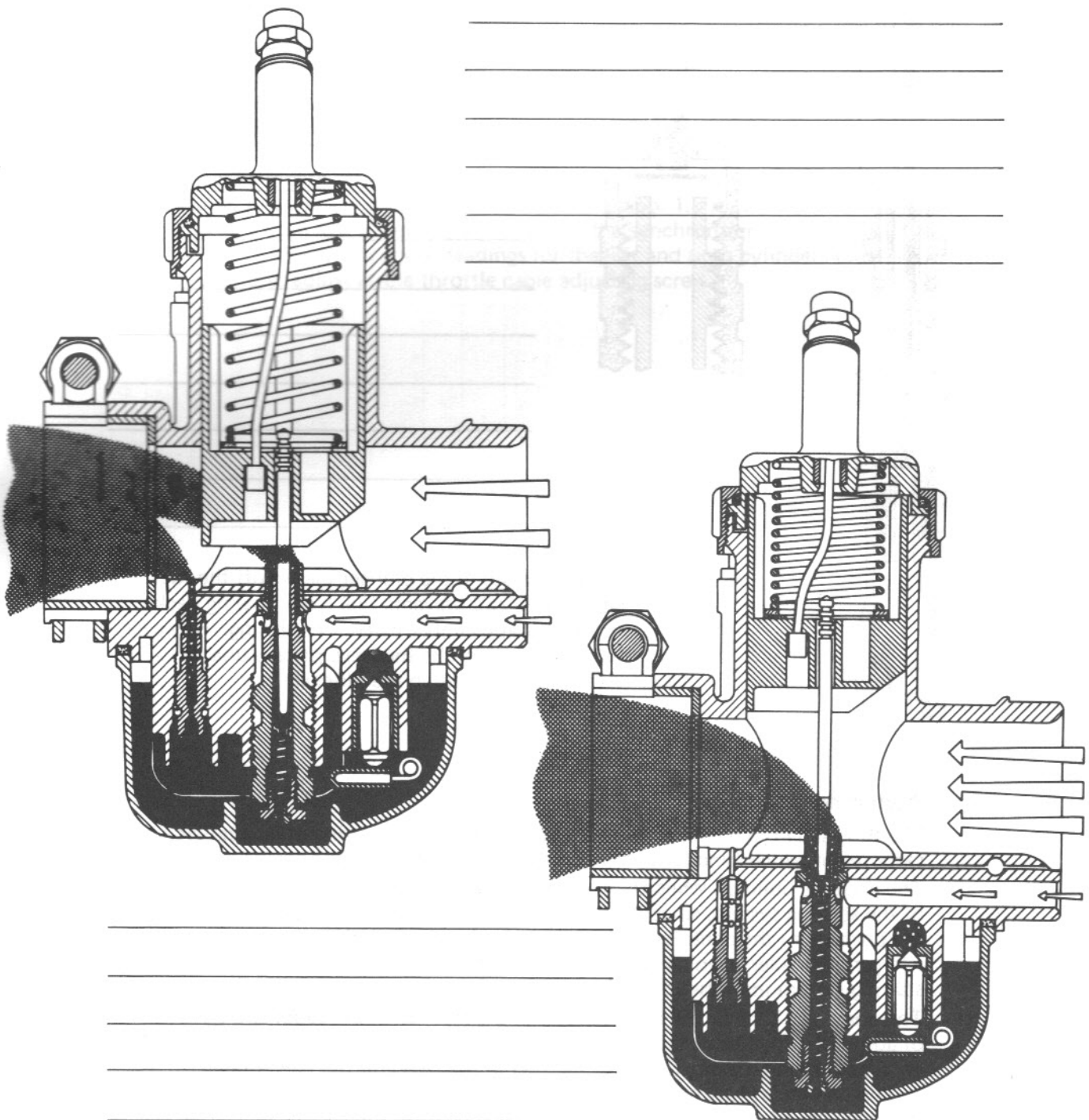
2.1 Idle system

The fuel drawn out of the float chamber through the idle jet is mixed with the incoming airflow from the idle air passage and then emerges into the main airflow volume immediately behind the slide plunger, through a bore leading into the inlet tract.

If the idle mixture regulating screw is tightened, the mixture will become richer; slackening the screw weakens the mixture. Idle speed is varied at the throttle stop screw.

2.2 Main jet system

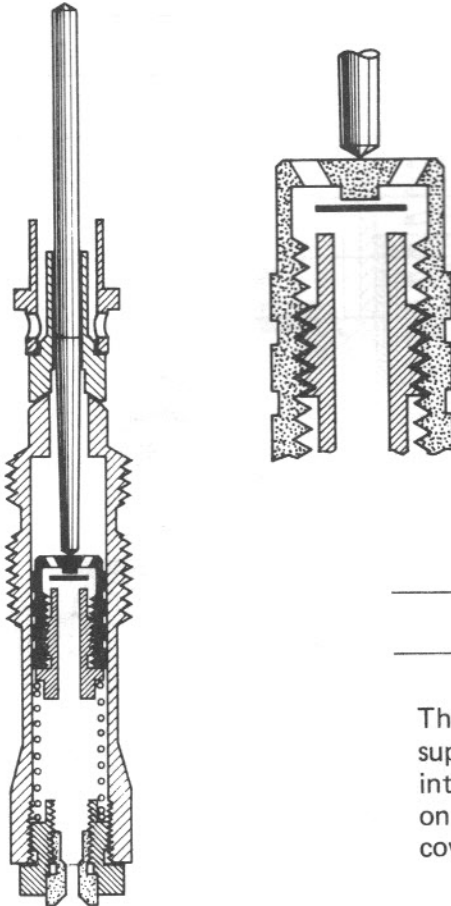
The main jet is screwed into the lower end of the mixing tube with the main jet block. The needle jet is located at the upper end of the mixing tube, and is closed by a conical jet needle. This jet needle is raised together with the throttle slide plunger by the wire cable, and lowered by a coil spring. Movement of the jet needle increases and decreases the annular cross-section of the needle jet, and movement of the throttle slide increases and decreases the opening in the air venturi.



Some of the intake air flows past the needle jet, after entering through a passage from the intake stub pipe; this air pre-atomizes the fuel emerging from the annular cross-section of the needle jet. In the air venturi the fuel-air mixture strikes the main airflow and is intensively atomized.

2.3 Accelerator pump

This device is installed in the main jet block. When the carburettor is in the idle position, the jet needle presses the plunger of the accelerator pump down. When acceleration takes place, the plunger is released, and the spring beneath it forces it up and pumps the fuel above the plunger additionally into the inlet tract through the needle jet.



The valve plate in the plunger blanks off the fuel supply bore and prevents fuel from flowing back into the float chamber when accelerating. However, on the suction stroke the valve plate is unable to cover the four holes in the plunger.

2.4 Starting device

The Bing slide-type carburettor has a starting device consisting of an auxiliary carburettor which functions only during starting and when the engine is cold. The pressure build-up when the engine is being started acts on the outlet bore of the starting system, since the slide plunger is almost closed. Depending on the position of the choke slide, which is raised and lowered by the choke cable, a larger or smaller opening is present to act on the air inlet aperture and the starting-system immersed tube.

The immersed tube in the fuel reservoir in the float chamber supplies a quantity of additional fuel for starting. The reservoir of fuel is connected by a calibrated bore to the float chamber. When the fuel in the reservoir has been drawn off, a certain volume of fuel only can flow in through the calibrated bore, with the result that the fuel-air mixture is again weakened after the engine has started.

2.5 Idle adjustment — slide-type carburettor

Basic setting:

Tighten the idle air regulating screw fully, then slacken it off by half a turn. Tighten the throttle slide stop screw until it just touches the slide, then tighten by a further turn.

Idle adjustment:

Slacken the locknuts on the wire cable adjusting screws. Tighten the adjusting screws until the outer sleeve of the cable has app. 3 — 5 mm play. Turn the throttle stop screw of the cylinder which runs at the speed farther away from the specified idle speed, until the two cylinders are identical. Turn the idle air regulating screw to left or right until the best mixture strength is obtained (this can be identified by the tendency of engine speed to rise). If the resulting engine idle speed is beyond the specified tolerance of 900 — 1000/min, turn both throttle stop screws by identical amounts to regulate engine speed. At the same time, adjust mixture strength at the air regulating screws (CO content of exhaust gas app. 4.5 %). Finally, reset play in the outer cable sleeves to app. 1.0 mm. Check transition (pick-up) from idle speed to part load with the synchronizer. Up to a speed of app. 1500/min, the synchronizer readings for the left and right cylinders must not differ. If necessary, adjust at the throttle cable adjusting screw.

Summary of carburettor types

Model	R 50/5	R 60/5	R 75/5	R 60/6	R 75/6	R 90/6	R 90 S
Carburettor type — left — right	V 56 1/26/113 1/26/114	V 56 1/26/111 1/26/112	V 64/I 64/32/3 64/32/4	V 56 1/26/111 1/26/112	V 64/I 64/32/9 64/32/10	V 64/I 64/32/11 64/32/12	Dellorto PHM 38 AS (BS) PHM 38 AD (BD)
Barrel diameter	26 mm	26 mm	32 mm	26 mm	32 mm	32 mm	38 mm
Main jet	135	140	140	135	135	150	155
Needle jet	2.68 with accel- erator pump	2.68	2.73	2.70	2.70 with accel- erator pump	2.68	2.60
Jet needle number	4	4	46-241	4	46-241	46-241	K 4
Needle position	3	2	2	2	3	1	3
Idle jet	35	40	45	40	45	45	60
Idle air jet	—	—	1.0 mm dia.	—	1.0	1.0	1.2
Idle air regulating screw: number of turns opened	0.5 — 1.0	0.5 — 1.0	—	1/4 — 1	—	—	—
Idle mixture regulating screw: number of turns opened	—	—	3/4 — 1 1/2	—	1/2 — 1	1	1 1/2
Bypass bore 1 2	0.8 mm dia.	0.8 mm dia.	0.7 mm dia.	0.8	1.0	0.7 0.65	1.4
Float valve	2.2 mm dia.	2.2 mm dia.	2.5 mm dia.	2.2	2.5	2.5	3.0
Weight of float	10 g	10 g	10 g	10 g	13 g	13 g	10 g

Summary of carburettor types

Model	R 60/7	R 75/7	R 100/7	R 100 S	R 100 RS
Carburettor type — left — right	V 56 1/26/123 1/26/124	V 64/1 64/32/13 64/32/14	V 64/1 64/32/19 64/32/20	V 94 94/40/103 94/40/104	V 94 94/40/105 94/40/106
Barrel diameter	26	32	32	40	40
Main jet	140	145	150	170	170
Needle jet	2,68 with accelerator pump	2,66	2,68	2,66	2,68
Jet needle number	4	46-241	46-241	46-341	46-341
Needle position	2	3	3	3	2
Idle jet	40	50	50	45	45
Idle air jet	—	Ø 1,0	Ø 1,0	Ø 1,0	Ø 1,0

Summary of carburettor types

Model	R 45 (20 kW)	R 45 (26 kW)	R 65	R 80/7	R 100 T	R 100 RT
Carburettor type — left — right	V 64/II 64/26/201 64/26/202	V 64/II 64/28/201 64/28/202	V 64/II 64/32/203 (0) 64/32/204 (0)	V 64/II 64/32/201 64/32/202	V 94 94/40/103 94/40/104	V 94 94/40/105 94/40/106
Barrel diameter	Ø 26	Ø 28	Ø 32	Ø 32	Ø 40	Ø 40
Main jet	118 (115)	123 (120)	140	145	170	170
Needle jet	2,66	2,66	2,66	2,66	2,66	2,68
Jet needle number	46-241	46-241	46-241	46-241	46-341	46-341
Needle position	2	2	3	3	3	2
Idle jet	45	45	45	50	45	45

Summary of carburettor types

Model	R 45 (20 kW)	R 45 (26 kW)	R 65	R 80 G/S	R 100/100 CS 100 RS/100 RT
Carburettor type — left — right	V 64/III 64/26/303 64/26/304	V 64/III 64/28/303 64/28/304	V 64/III 64/32/307 (O) 64/32/308 (O)	V 64/III 64/32/305 64/32/306	V 94 94/40/111 94/40/112
Barrel diameter	Ø 26	Ø 28	Ø 32	Ø 32	Ø 40
Main jet	98	105	145 (148)	145 (148)	160
Needle jet	2,66	2,66	2,64	2,64	2,66
Jet needle number	46-241	46-241	46-241	46-241	46-341
Needle position	2	2	4	4	3
Idle jet	45	45	45	45	45