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SPECIFICATIONS

GENERAL

Type designation	B 18 B (type 1)	B 18 B (type 2)	B 18 B (type 3)
Output h.p. at r.p.m. (SAE)	100/5500	108/5800	115/6000
(DIN)	90/5500	96/5600	96/5600 ¹⁾ 100/5600 ²⁾ 103/5500 ³⁾
Max. torque, kgm (lb.ft.) at r.p.m. (SAE)	15.0 (108)/4000	15.2 (110)/4000	15.5 (112)/4000
(DIN)	14.1 (102)/3400	14.3 (103)/3800	14.7 (106)/3500 ¹⁾ 14.8 (107)/3500 ²⁾ 15.0 (108)/3800 ³⁾
Compression when turning over with starter motor at 250-300 r.p.m. kg/cm ²	12-14	12-14	12-14
lb/sq.in.	170-200	170-200	170-200
Compression ratio	9.5:1	10.0:1	10.0:1
Type designation	B 18 D (type 1)	B 18 D (type 2)	B 18 D (type 3)
Output h.p. at r.p.m. (SAE)	90/5000	95/5400	100/5700
(DIN)	80/5000	86/5000	90/5500
Max. torque, kgm at r.p.m. (SAE)	14.5 (105)/3500	14.8 (107)/3800	15.0 (108)/3500
(DIN)	14.0 (101)/3000	14.2 (102)/3500	14.5 (105)/3200
Compression when turning over with starter motor at 250-300 r.p.m. kgm/cm ²	11-13	11-13	11-13
lb/sq.in.	156.4-185.0	156.4-185.0	156.4-185.0
Compression ratio	8.5:1	8.7:1	8.7:1

	B 18 B	B 18 D
No. of cylinders		4
Bore		84, 14 mm (3.313")
Stroke		80 mm (3.150")
Displacement		1.78 litres

CYLINDER BLOCK

Material	Special-alloy cast iron
Nominal bore, standard	84.14 mm (3.313")
0.020" oversize	84.65 mm (3.332")
0.030" oversize	84.90 mm (3.342")
0.040" oversize	85.16 mm (3.353")
0.050" oversize	85.41 mm (3.362")

PISTONS

Material	Light-alloy
Permissible weight difference between pistons in same engine	10 g (0.35 oz.)
Height, overall, early prod.	83.5 mm (3.29")
late prod.	71.0 mm (2.79")
Height from centre of gudgeon pin to piston crown	46 mm (1.81")
Piston clearance	0.02-0.04 mm (0.0008-0.0016")

¹⁾ 120 ²⁾ 140 ³⁾ 1800

These variations are a result of the different exhaust emission control systems.

PISTON RINGS

Piston ring gap	0.25–0.50 mm (0.010–0.020")
Piston ring overloads	0.020" 0.030"
	0.040" 0.050"

Compression rings

Marked "TOP". Upper ring on each piston chromed.

Number of rings on each piston	2
Height	1.98 mm (0.078")
Compression ring clearance in groove	0.054–0.081 mm (0.0021–0.0032")

Scraper rings

Number on each piston	1
Height	4.74 mm (0.187=3/16")
Scraper ring clearance in groove	0.044–0.072 mm (0.0017–0.0028")

GUDGEON PINS

Floating fit. Circlips at both ends in piston.

Fit:

In connecting rod	Close running fit
In piston	Push fit
Diameter, standard	22.00 mm (0.866")
0.05 mm (0.002") oversize	22.05 mm (0.868")
0.10 mm (0.004") " "	22.10 mm (0.870")
0.20 mm (0.008") " "	22.20 mm (0.874")

CYLINDER HEAD

Height, measured from cylinder head contact surface to face under bolt heads	87.0 mm (3.425")	83 mm (3.465")
	(type 1)	
	86.2 mm (3.394")	
	(types 2 and 3)	
Distance from upper surface of cylinder head to upper end of overflow pipe (pipe located under thermostat)	35 mm (1.38")	

CRANKSHAFT

Crankshaft end float	0.017–0.108 mm (0.0007–0.0042")
Big-end bearings, radial clearance	0.039–0.081 mm (0.0015–0.0032")
Main bearings, radial clearance	0.038–0.089 mm 0.026–0.077 mm
	(0.0015–0.0035") (0.0010–0.0030")

MAIN BEARINGS**Main bearing journals**

Diameter, standard	63.441–63.451 mm (2.4977–2.4982")
undersize 0.010"	63.187–63.200 mm (2.4877–2.4882")
0.020"	62.933–62.946 mm (2.4777–2.4782")
0.030"	62.679–62.692 mm (2.4677–2.4682")
0.040"	62.425–62.438 mm (2.4577–2.4582")
0.050"	62.171–62.184 mm (2.4477–2.4482")

Width on crankshaft for flange bearing shell	
Standard	38.930–38.970 mm (1.5327–1.5342")
Undersize 1 (undersize shell 0.010")	39.031–39.072 mm (1.5367–1.5383")
2 (" " 0.020")	39.133–39.173 mm (1.5407–1.5422")
3 (" " 0.030")	39.235–39.275 mm (1.5447–1.5463")
4 (" " 0.040")	39.336–39.376 mm (1.5487–1.5502")
5 (" " 0.050")	39.438–39.478 mm (1.5527–1.5543")

MAIN BEARING SHELLS

Thickness, standard	1.979–1.985 mm	1.985–1.991 mm
undersize 0.010"	(0.0779–0.0781")	(0.0781–0.0784")
0.020"	2.106–2.112 mm	2.112–2.118 mm
0.030"	(0.0829–0.0831")	(0.0831–0.0834")
0.040"	2.233–2.239 mm	2.239–2.245 mm
0.050"	(0.0879–0.0881")	(0.0831–0.0884")
0.060"	2.330–2.366 mm	2.366–2.372 mm
0.070"	(0.0929–0.0931")	(0.0931–0.0934")
0.080"	2.407–2.493 mm	2.493–2.499 mm
0.090"	(0.0979–0.0981")	(0.0981–0.0984")
0.100"	2.614–2.620 mm	2.620–2.626 mm
	(0.1029–0.1031")	(0.1031–0.1034")

BIG-END BEARINGS

Big-end bearing journals

Journal width	31.950–32.050 mm (1.2579–1.2618")
Diameter, standard	54.089–54.102 mm (2.1295–2.1300")
undersize 0.010"	53.835–53.848 mm (2.1195–2.1200")
0.020"	53.581–53.594 mm (2.1095–2.1100")
0.030"	53.327–53.340 mm (2.0995–2.1000")
0.040"	53.073–53.086 mm (2.0895–2.0900")
0.050"	52.819–52.832 mm (2.0795–2.0800")

Big-end bearing shells

Thickness, standard	1.833–1.841 mm (0.0722–0.0725")
undersize 0.010"	1.960–1.968 mm (0.0772–0.0775")
0.020"	2.087–2.095 mm (0.0822–0.0825")
0.030"	2.214–2.222 mm (0.0872–0.0875")
0.040"	2.341–2.349 mm (0.0922–0.0925")
0.050"	2.468–2.476 mm (0.0972–0.0975")

CONNECTING RODS

End float on crankshaft	0.15–0.35 mm (0.006–0.014")
Length, centre–centre	145 ± 0.1 mm (5.710 ± 0.004")
Maximum permissible difference in weight between connecting rods in the same engine	6 g (0.21 oz.)

FLYWHEEL

Permissible axial throw, max.	0.05 mm/150 mm diam.
Ring gear (chamber facing forwards)	(0.002"/6" diam.)
	142 teeth

FLYWHEEL HOUSING

Permissible axial throw, max.	0.05 mm/100 mm diam.
Max. radial throw for rear guide	(0.002"/4" diam.)
	0.15 mm (0.006")

CAMSHAFT

Marked	Type 1	B	A
	Type 2 and 3	C	B
Number of bearings		3	
Front bearing journal, diameter		46.975–47.000 mm (1.8494–1.8504")	
Centre bearing journal, diameter		42.975–43.000 mm (1.6919–1.6929")	
Rear bearing journal, diameter		36.975–37.000 mm (1.4557–1.4567")	
Radial clearance		0.020–0.075 mm (0.0008–0.0030")	
End float		0.020 0.060 mm (0.0008–0.0024")	
Valve clearance opening angle for check of camshaft setting (cold engine)			
Type 1		1.15 mm (0.045")	1.1 mm (0.043")
		0° (T.D.C.)	10° after I.D.C.
Types 2 and 3		1.45 mm (0.057")	1.15 mm (0.045")
		0° (T.D.C.)	0° (T.D.C.)

CAMSHAFT BEARINGS

Front bearing, diameter	47.020–47.050 mm (1.8512–1.8524")
Centre bearing, diameter	43.025–43.050 mm (1.6939–1.6949")
Rear bearing, diameter	37.020–37.045 mm (1.4575–1.4585")

TIMING GEARS

Crankshaft gear, number of teeth	21
Camshaft gear, (fibre), number of teeth	42
Tooth flank clearance	0.04–0.08 mm (0.0016–0.0032")
End float, camshaft	0.02–0.06 mm (0.0008–0.0023")

VALVES**Inlet**

Disc diameter	40 mm (1.58")
Stem diameter	8.685–8.700 mm (0.3419–0.3425")
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	1.4 mm (0.055")

Exhaust

Disc diameter	35 mm (1.38")
Stem diameter	8.645–8.660 mm (0.3403–0.3409")
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	1.4 mm (0.055")

Valve clearances

Clearance, warm engine and cold engine, inlet:		
Types 1, 2 and 3	0.50–0.55 mm	0.40–0.45 mm
	(0.020–0.022")	(0.016–0.018")

loaded with 4.0±0.2 kg (9± ¹ / ₂ lb.)	27.5 mm (1.08")
9.5±0.3 kg (21± ³ / ₄ lb.)	22.5 mm (0.88")
8.0±0.8 kg (18±1 ³ / ₄ lb.)	22.5 mm (0.88")

FUEL SYSTEM

Fuel pump

Fuel pump, type I. Diaphragm pump	AC-UG
Fuel pump, type II. Diaphragm pump	Pierburg APG
Fuel pump, type III. Diaphragm pump	AC-YD
Fuel pressure, measured at same height as pump	min. 0.11 kg/cm ² (1.5 lb./sq.in.) max. 0.25 kg/cm ² (3.5 lb./sq.in.)

Carburettors

Type	Horizontal
Make and designation	SU-HS 6
Number of carburettors	2
Size (air intake)	44.5 mm (1 3/4")

Metering needle

Type of engine	Type of filter	
	Paper	Sound absorbing
B 18 B type 1	TZ	KF
type 2	ZH	
type 3	KD	
type 4 ^{b)}	DX	
B 18 D type 1	KA or XH	KB
type 2	ZH	KE
type 3	ZM	KG

^{b)} Exhaust emission control

Idling speed	600-800 r.p.m.	500-700 r.p.m.
Idling speed exhaust emission control	800 r.p.m.	
Oil for damping cylinders	Hydraulic oil ATF, type A	

IGNITION SYSTEM

Voltage	12 V	
Order of firing	1-3-4-2	
Ignition timing setting B 18 D 97-100 octane ROT, at 1500 r.p.m. (Vacuum regulator on B 18 D disconnected)	Type 1 22-24° before T.D.C.	Types 2 and 3 17-19° before T.D.C.
Ignition timing setting, B 18 B 100 octane ROT, at 1500 r.p.m.	17-19° before T.D.C.	
Ignition timing setting for exhaust emission control	3-5° at 850 r.p.m.	
Sparking plugs	Bosch W 200 T35	Bosch W 175 T1
Sparking plug gap	0.7-0.8 mm (0.028-0.032")	
Tightening torque	3.5-4.0 kgm 25.3-28.9 lb.ft.	3.8-4.5 kgm 27.5-32.5 lb.ft.

Distributor

Make	Bosch
Contact breaker gap	0.4–0.5 mm (0.016–0.020")
Pressure	0.4–0.6 kg (0.8–1.3 lb.)
Dwell angle	62 ± 3°
Direction of rotation	Anti-clockwise

COOLING SYSTEM

Type	Pressurized
Radiator cap opens at	0.23–0.30 kg/cm ² (3–4 lb./sq in.)
Capacity	Approx. 8.5 litres (2 Imp. galls = 2 1/4 US galls.)
Fan belt designation	HC 38 × 35"
Tension: The pulley should start slipping when the force applied is	8.0–11 kg (17.6–24.3 lb.) at a lever of 150 mm (6")

Anti-freeze

All year round 50 % Volvo genuine anti-freeze fluid, 50 % water. Replace every other year.

Thermostat

Type	Fulton Syphon 1–1700-D 3
Marking	170
Starts to open at	75–78° C (167–172° F)
Fully open at	89° C (192° F)

WEAR TOLERANCES**Cylinders**

To be re-bored when wear reaches (if engine shows abnormal oil consumption)	0.25 mm (0.010")
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Crankshaft

Max. permissible out-of-round on main bearing journals ..	0.05 mm (0.0020")
Max. permissible out-of-round on big-end bearing journals	0.07 mm (0.0030")
Max. crankshaft end float	0.15 mm (0.0060")

Valves

Max. permissible clearance between valve stems and valve guides	0.15 mm (0.0060")
Max. permissible wear, valve stems	0.02 mm (0.0008")

Camshaft

Maximum out-of-round (with new bearings)	0.07 mm (0.0030")
Maximum wear, bearings	0.20 mm (0.008")

Timing gears

Maximum backlash	0.12 mm (0.0050")
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TIGHTENING TORQUES

	Kgm	lb. ft.
Cylinder head	8.5-9.5	61-69
Main bearings	12-13	87-94
Big-end bearings	5.2-5.8	38-42
Flywheel	4.5-5.5	33-40
Sparking plugs, W 175 T1	3.8-4.5	27-33
W 200 T35	3.5-4.0	25-29
Camshaft nut	13-15	94-108
Crankshaft pulley bolt	7-8	51-58
Dynamo bolt (3/8"-16)	3.5-4.0	25-29
Nut for oil cooler	3.0-3.5	22-25
Nipple for oil cooler and oil filter	4.5-5.5	33-40
Sump bolts	0.8-1.1	6-8

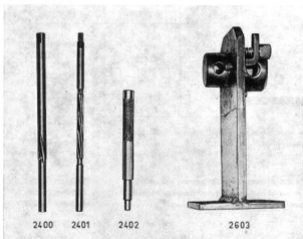
TOOLS

Fig. 1. Tools for carburetors

SVO 2400 Reamer for bush seat

SVO 2401 Reamer for bush

SVO 2402 Drift for fitting bush

SVO 2603 Frame

GROUP 20

GENERAL DESCRIPTION

This service manual, which concerns the B 18 B and B 18 D engines, is intended as a supplement to the service manual for the B 18 engine and therefore deals only with those components which are characteristic for the B 18 B and B 18 D units. Other instructions which are common for all the engines in the B 18 series are, subsequently, included in the service manual for the B 18 A engine. However, the specifications at the beginning of this manual are complete. The B 18 B and B 18 D engines are both fitted with twin horizontal carburetors.

Since the B 18 B engine has a higher compression ratio and a camshaft with different timing, it has a higher output and also a higher rated speed. Engine output is shown in the specifications.

On the B 18 B engines, both the main and big-end bearings consist of steel shells lined with indium-plated lead-bronze bearing metal. On the B 18 D engine, the bearing metal in the main bearing shells consists of Babbitt's metal. For other detailed information, see the specifications at the beginning of this manual.

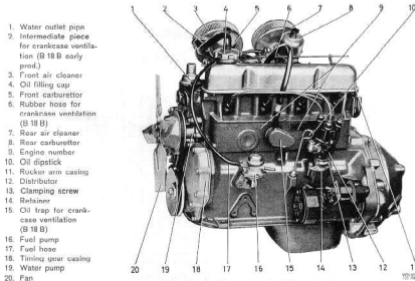
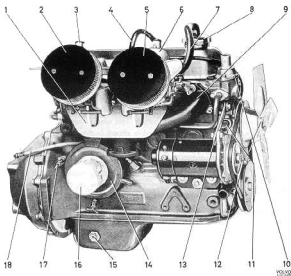
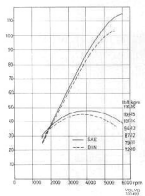


Fig. 2. The engine viewed from the left

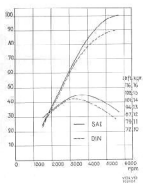


1. Shield plate
2. Rear air cleaner
3. Rear carburettor
4. Rubber hose for crankcase ventilation (B 18 B)
5. Front air cleaner
6. Front carburettor
7. Rubber hose for crankcase ventilation (B 18 B)
8. Oil filling cap
9. Exhaust manifold
10. Water outlet pipe
11. Water pipe from heater
12. Ignition timing mark
13. Belt tensioner
14. Oil cooler (B 18 B early prod.)
15. Take-off for oil temperature gauge (B 18 B)
16. Oil filter
17. Draining cock
18. Hose for oil pressure gauge

Fig. 3. The engine viewed from the right (Oil cooler only on B 18 B early prod.)



B 18 B



B 18 D

Fig. 4. Output and torque curves for B 18 B
RM = r.p.m.

GROUP 22

LUBRICATING SYSTEM

DESCRIPTION

OIL COOLER (B 18 B early prod.)

The early prod. B 18 B engine is fitted with an oil cooler.

The oil cooler (Fig. 6) is fitted between the oil filter and the cylinder block and consists of an inner section for the oil which is surrounded by a cooling jacket. The engine coolant is led through the cooling jacket. On its way to the oil filter, the oil passes through the cooler and some of the heat in the oil is conducted away by the coolant. The coolant cannot pass the shortest way from the inlet (1) to the outlet (6), but is forced to circulate round the cooler through the channels formed by the baffles (5). The oil is forced between the pairs of discs (4) in turn due to the transverse baffles (4) on the discs (4) and then finally passes out to the oil filter.

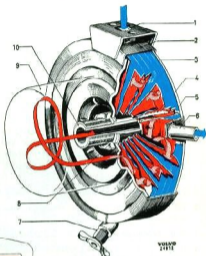


Fig. 6. Oil cooler (B 18 B early prod.)

1. Coolant inlet
2. Housing
3. Discs
4. Transverse baffles
5. Baffles
6. Cooling outlet
7. Drain cock for coolant
8. Nut
9. Oil filter
10. Nipple

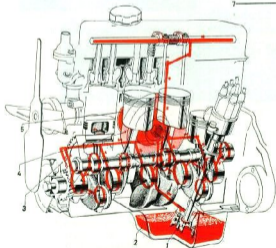


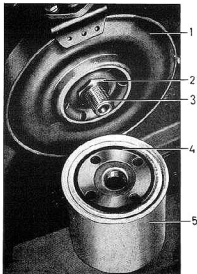
Fig. 5. Lubricating system

1. Oil pump
2. Sump
3. Nozzle
4. Oil cooler (B 18 B early prod.)
5. Oil filter

REPAIR INSTRUCTIONS

REPLACING THE OIL COOLER (B 18 B)

1. Drain off the engine coolant.
2. Disconnect the coolant connections on the oil cooler. Remove the oil filter.
3. Unscrew the nut (2, Fig. 7) on the nipple for the oil cooler, and pull off the cooler.
4. Fit the oil cooler in the reverse order. The O-ring against the cylinder block should be replaced if necessary, in which case it should be inserted into the groove on the oil cooler before re-fitting. Coat the groove with a thin layer of adhesive which is resistant to oil up to temperatures of 140°C (280°F), for example, Pliobond 20. With the nut tightened to a torque of 1 kgm (7 lb.ft.), check that the cooler is in good contact with the cylinder block all round. The nut is finally tightened to a torque of 3–3.5 kgm (23–25 lb.ft.).
5. Fit the oil filter and connect the coolant pipes.
6. Fill up with coolant and, if necessary, also engine oil.
7. Start the engine and check for leakage.
8. If the nipple (3) has been replaced, the new one should be tightened to a torque of 4.5–5.5 kgm (33–40 lb.ft.).



VOLVO
24647

Fig. 7. Oil cooler and oil filter

1. Cooler
2. Nut
3. Nipple
4. Gasket
5. Oil filter

GROUP 23

FUEL SYSTEM

DESCRIPTION

CARBURETTORS

The twin SU-HS6 carburetors are of the horizontal type. Movement of the accelerator pedal is transmitted to the throttle flap by means of the shaft between the carburetors which is flexibly

mounted in the throttle flap spindle levers. When starting from cold, the fuel/air mixture is enriched by lowering the jets. This also operates the fast idling device. The various functions are described under the following headings.

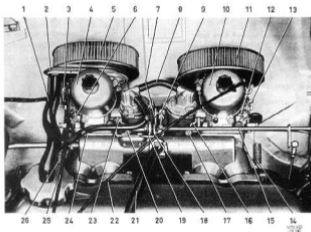


Fig. 8. Carburettor assembly (early prod.)

- | | | |
|---|--------------------------------------|--|
| 1. Rubber hose for crankcase ventilation (B 18 B) | 8. Fuel hose | 10. Lever |
| 2. Intermediate piece for crankcase ventilation | 9. Link | 19. Stop |
| 3. Clamping screw for choke control | 10. Rear carburettor | 20. Locking screw |
| 4. Front carburettor | 11. Rear air cleaner | 21. Rubber hose for crankcase ventilation (B 18 B) |
| 5. Front air cleaner | 12. Idle adjusting screw | 22. Choke control |
| 6. Idle adjusting screw | 13. Clamping screw for choke control | 23. Lever on intermediary shaft |
| 7. Lever | 14. Return spring | 24. Fuel hose |
| | 15. Control shaft | 25. Choke control |
| | 16. Lever on intermediary shaft | 26. Return spring |
| | 17. Locking screw | |

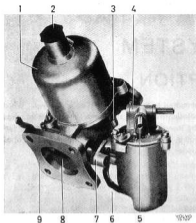


Fig. 9. Carburettor viewed from left

- | | |
|-----------------------------|----------------------|
| 1. Suction chamber | 5. Ventilation hole |
| 2. Screw for damping piston | 6. Fuel line |
| 3. Lifting pin | 7. Lever |
| 4. Floatchamber cover | 8. Throttle flap |
| | 9. Connecting flange |

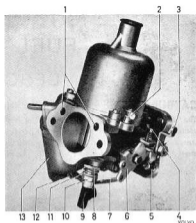


Fig. 10. Carburettor viewed from right

- | |
|---------------------------------|
| 1. Ventilation holes |
| 2. Attachment for choke control |
| 3. Lever |
| 4. Idling screw |
| 5. Screw for fast idling |
| 6. Lever |
| 7. Link for jet |
| 8. Locknut |
| 9. Jet |
| 10. Adjusting nut |
| 11. Spring |
| 12. Fuel line |
| 13. Floatchamber |

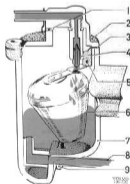


Fig. 11. Float mechanism

- | | |
|--|-----------------|
| 1. Ventilation hole with protective washer | 5. Pin |
| 2. Floatchamber cover | 6. Float |
| 3. Gasket | 7. Floatchamber |
| 4. Valve | 8. Fuel line |
| | 9. Union |

Float

The floatchamber is bolted onto the carburettor housing.

The valve (4, Fig. 11) which is opened and closed by the float, is fitted in the cover. The fuel is taken to the lower end of the jet through a flexible hose (8) from the lower part of the floatchamber.

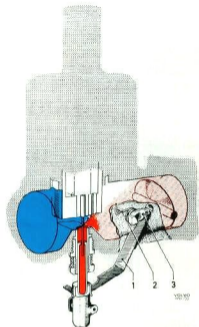


Fig. 12. Starting from cold

1. Link
2. Return spring
3. Lever

Starting from cold

When the engine is started from cold, the fuel/air mixture can be enriched by lowering the jets, see Fig. 12, which is done through a linkage system from the choke control on the instrument panel. Since the metering needle is tapered, the cross-sectional area for the fuel flow increases when the jet is lowered.

When the choke control is pulled out, the outer end of the lever (3) is pressed downwards and influences the jet so that this is also pressed down. In addition, the fast idling screw is influenced by the cam on the lever (2, Fig. 15) and the throttle flap opens slightly.

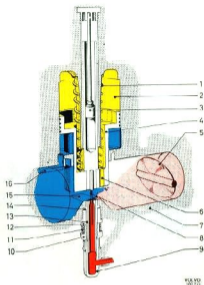


Fig. 13. Carburettor function, normal running

Blue - Atmospheric pressure
Red = Fuel
Yellow - Vacuum

Light red - Fuel/air mixture

- | | |
|--------------------|--------------------|
| 1. Spring | 9. Jet |
| 2. Suction chamber | 10. Adjusting nut |
| 3. Damper piston | 11. Locking spring |
| 4. Air valve | 12. Lock nut |
| 5. Throttle flap | 13. Jet sleeve |
| 6. Channel | 14. Washer |
| 7. Housing | 15. Bridge |
| 8. Metering needle | 16. Channel |

Running

The flow of air passing through the carburetors when the engine is running increases in speed when it passes through the constriction, known here as the bridge, (15, Fig. 13). Fuel is added to the flow of air through the jet which opens out at the bridge.

The vertical position of the air valve is determined by the difference between the vacuum in the carburettor and atmospheric pressure, since the top of the valve has access to the space between the throttle flap and bridge, whereas the underside of the valve is influenced by atmospheric

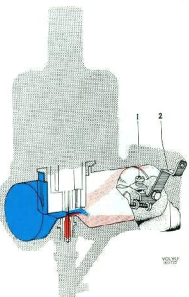


Fig. 14. Carburettor, idling

1. Idle adjusting screw 2. Lever for return spring

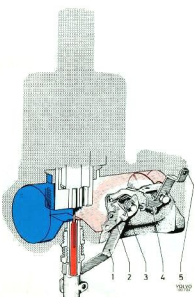


Fig. 15. Carburettor, fast idling

1. Link
 2. Lever
 3. Return spring
 4. Fast idle screw
 5. Lever for throttle flap spindle

pressure. When engine loading increases, the degree of vacuum also increases, so that the valve and tapered fuel needle rise and permit an increased amount of fuel/air mixture to flow into the cylinders.

The supply of fuel and air is thus dependent on the degree of vacuum in the carburettor venturi, and so the carburettors work in accordance with a continuously variable principle.

In order to prevent excessively rapid movements of the air valve, there is a damper piston (3) which runs in an oil-filled cylinder.

Idling

When the engine is idling, only a small amount of fuel/air mixture passes through the carburettors. The throttle flap is held slightly open by the idling screw (1, Fig. 14). Idling adjustment on each carburettor is done independently. The shaft between

the carburettors, see Fig. 8, is not permanently fixed to the throttle flap spindles but is flexibly mounted in the ends of the levers.

The fuel/air mixture is adjusted with the adjusting nuts (10, Fig. 13) on the jets and the adjustment carried out at idling speed is sufficient to cover the entire speed range.

Fast idling

When the choke control is pulled out, the throttle flap is also influenced. One end of the lever (2, Fig. 15) is in the form of a cam which presses on the fast idle screw (4) whereby the throttle flap is opened.

This means that the engine runs at a faster idling speed during the time the choke control is pulled out.

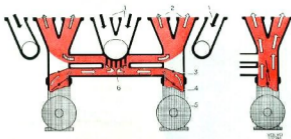


Fig. 16. Exhaust emission control

A — low engine loading (preheating)

B = high engine loading (direct induction)

- | | |
|-----------------------|-----------------------|
| 1. Exhaust manifold | 4. Primary throttle |
| 2. Induction manifold | 5. Carburettor |
| 3. Secondary throttle | 6. Preheating chamber |

EXHAUST EMISSION CONTROL

Some of the B 18 B engines in use are fitted with an exhaust emission control system.

This system results in a more complete combustion with lower traces of carbon-monoxide and hydrocarbons in the exhaust gases. This is achieved by means of a modified induction system which permits a more exact and leaner fuel/air mixture. Fig. 16 shows the principle of this system as applied to the B 18 B engine.

The induction manifold houses two secondary throttles (3, Fig. 16). During normal driving conditions (using low output) the throttles (3) are closed (left-hand section of Fig. 16) so that the fuel/air mixture from the carburettors is led to a central preheating chamber (6) where the mixture is heated by the surrounding exhaust gases and is completely vaporized.

When higher output is used which requires an increased opening at the primary throttle (4), the secondary throttles (3) are also opened and the fuel/air mixture passes from the carburettors directly into the cylinders without passing the preheating chamber.

The engine is, in other words, provided with a dual induction system, one for low-output use and one for high-output use.

In city driving, which normally only requires low output, an improved fuel economy is also achieved. The transition from the low output to the high output system takes place automatically since the primary and secondary throttles (3) are connected by means of a simple cam system which results in the secondary throttle commencing to open at a point when the primary throttle is approximately 2/3rds open (Fig. 33). The primary throttle is fitted with a spring-loaded valve which comes into function during engine braking and provides additional air to ensure complete combustion.

To simplify centering of the jet it has been made longer so that in its upper position (screwed up fully) it reaches above the bridge in the carburettor. The needle has been altered and a steel washer has been placed between the nut and the jet guide.

The distributor has been replaced by a distributor with a different rating characteristic.



Fig. 17. Air cleaner

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AIR CLEANERS

The air cleaners, one on each carburettor, consist of a sheet-metal casing with an element made of special paper, see Fig. 16. Particles of dust and other impurities in the air are trapped when the air passes through the element. The air cleaners require no servicing and may not be oiled. They should be replaced with exchange units after a certain mileage.

On right-hand drive cars, the air cleaners are fitted with replaceable paper inserts.

AIR CLEANER WITH PREHEATING UNIT

Late prod. B 18 B engines are fitted with an air cleaner with a preheating unit, (Fig. 18) where the induction air, during starting and running with a cold engine, are drawn in through a hot-spot duct (14), which takes heat from the exhaust pipe. When the engine warms up, a flap in the flap housing (11) is influenced by a thermostat and the air is then drawn in directly through the air intake (12). In this manner the temperature of the induction air is kept at a constant level.

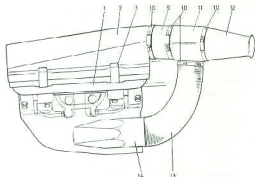


Fig. 18. Air cleaner with preheating unit

- | | |
|------------------|----------------------|
| 1. Lower section | 8. Insert |
| 2. Upper section | 9. Hose |
| 3. Clips | 10. Hose clip |
| 4. Gasket | 11. Flap housing |
| 5. Washer | 12. Air intake |
| 6. Screw | 13. Hose |
| 7. Spring washer | 14. Preheating plate |



VOLVO
18 B

REPAIR INSTRUCTIONS

CARBURETTORS

Each time the car is greased, the oil level in the carburettor damping cylinders should be checked. If required, top up with ATF oil, type A (not multi-grade oil). See Fig. 19.

Do not top up with too much oil, only the centre spindle should be filled, not the area above this.

Removing the carburetors

Both the carburetors must be removed at the same time from the intake manifold since the intermediate shaft is mounted to the levers on the throttle flap spindles.

1. Remove the air cleaners, fuel pipes, vacuum hose and controls for the carburetors.
2. Unscrew all nuts which hold the carburetors to the intake manifold.
3. Pull off both carburetors at the same time from the intake manifold. Cover the induction ports with masking tape.

Dismantling the carburetors

1. Remove the dampor piston and suction chamber complete with valve.
2. Unscrew the floatchamber cover and lift it up. Then remove the floatchamber.



Fig. 19. Checking the oil level

1. Nut 2. Suction chamber

3. Remove the screws which hold the levers for the choke and fast idling control, pull them off and remove the jet.

Remove the adjusting nut and lock nut as well as the jet sleeve, see Fig. 28.

4. Wash all parts in white spirit and blow them dry with compressed air.

The air cleaners must not be washed since they have paper elements.

Re-bushing of carburettor

If the throttle spindle fits loosely in the housing the housing should be re-bushed as follows:

1. Loosen the screws and remove the throttle flap. Remove the throttle spindle.
2. Place fixture 2603 in a vice and clamp the carburettor in the fixture with hooks as shown in Fig. 20. For work on SU carburetors, use the larger stud on the fixture. Ensure that the hole in the stud aligns with the throttle spindle hole.
3. Ream the hole for the throttle spindle in the housing with reamer SVO 2400, Fig. 20. Do not pull the reamer backwards out of the hole, but instead loosen the support and push the reamer through the hole in the bottom plate in the same direction as reaming was carried out. If reaming is carried out in an upright drilling machine, then the lowest speed must be used and the reaming tool must be fastened in the

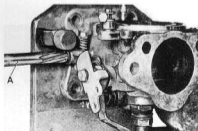


Fig. 20. Reaming the bush seat

A = SVO 2400

chuck with great care so that it does not throw. If the reamer does throw, the hole will be too large, the bush will loosen and the housing will then have to be scrapped.

NOTE!

During re-bushing of the carburettor housing for SU carburettors, it may happen that the reamer seizes in the housing. This is probably the result of a piece of the old bushing having loosened from the housing and fastened to the reamer. Should this be the case, withdraw the reamer, remove the old bushing and then continue reaming.

4. After reaming has been carried out, turn the fixture stud through 90° so that it forms a stop inside the carburettor housing for the bush which can then be driven into position with drift SVO 2402, Fig. 21.
5. Turn the fixture stud a further 90° and ream the newly fitted bush with reamer SVO 2401, Fig. 22.
6. Re-fit the throttle flap and a new throttle spindle. Twist or rivet the throttle flap screws.
7. Replace the carrier yoke as shown in Fig. 24 (throttle fully closed, idling screw screwed out). Ensure that a clearance of 1.5 mm (0.06") is obtained between the carrier yoke and the throttle housing. Drill with the carrier in position as shown in Fig. 23 and using a 3.0 mm (0.12") drill, the hole for the locking pin is drilled through the throttle spindle, (the hole must be drilled at right angles to the carburettor length axis when the throttle is closed).

Remove all drillings, fit the carrier yoke and locking pin.

8. Fit the float housing.

Checking and assembling the carburettors

Before assembling, check that all parts are undamaged. The fit of the air valve in the chamber is of a particularly close tolerance and its character must not be altered by filing or scraping. Minor unevenness can be removed by careful polishing with fine emery cloth.

1. Fit the metering needle as shown in Fig. 24. Only the tapered part of the needle should project outside the piston.

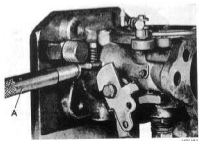


Fig. 21. Driving in of bush
A = SVO 2402

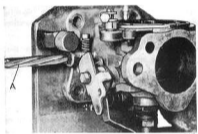


Fig. 22. Reaming of bush
A = SVO 2401

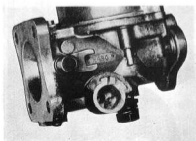


Fig. 23. Carrier yoke position

2. Fit the spring, washer and piston in the suction chamber and bolt this to the carburettor housing.
3. Fit the jet sleeve and lock nut, see Fig. 28. Push in the jet and centre it, see "Centering the jet".
4. Fit the spring for the adjuster nut and jet, see Fig. 28.
5. Check and attach the float valve (see Fig. 27). Fit the float and cover. Fit the floatchamber and connect the fuel line to the jet.

Fit of air valve

The fit can be checked by plugging the air holes in the valve with, for example, small corks, placing them in the suction chamber and holding the parts upside down. The damper piston should be fitted but not filled with oil. The air valve spring should not be fitted. The valve should normally sink to the bottom from the position shown in Fig. 26, within 5-7 seconds.

Replacing the float valve

1. Remove the floatchamber cover and turn it upside down.
2. Remove the pin for the float lever. Remove the float.
3. Screw out the valve and fit a new valve. Replace the float.
4. Check that the cover gasket is in good condition and then fit and tighten the cover.

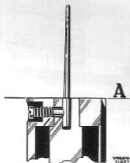


Fig. 24. Attachment of metering needle
A = Fixing level

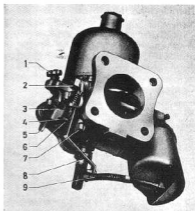


Fig. 25. Levers and springs

- | | |
|--|--------------------------------|
| 1. Attachment for choke control outer casing | 5. Lever for fast idling, etc. |
| 2. Throttle flap spindle | 6. Lever for lowering jet |
| 3. Return spring | 7. Bolt for floatchamber |
| 4. Return spring | 8. Link for lowering jet |
| | 9. Fuel line |

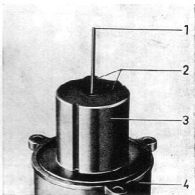


Fig. 26. Fit of air valve

- | | |
|-------------------------|--------------------|
| 1. Metering needle | 3. Air valve |
| 2. Rubber or cork plugs | 4. Suction chamber |

Checking the float level

This type of carburettor is relatively insensitive to variations in the float level. As a guide value for the correct level, the position of the float can be checked in accordance with the measurements shown in Fig. 27.

Centering the jet

Place the carburettor with the flange with four holes downwards. Screw up the jet adjuster nut so that upper end of the jet reaches up above the bridge. Loosen the lock nut (4, Fig. 28) and press the air valve against the bridge and also move it back and forth a couple of lines. Tighten the lock nut carefully and check the centering by lifting the valve 5–6 mm (1/4") from the bridge and then release it. The valve should then, quite audibly, hit the bridge (jet).

Fitting the carburetors

1. Remove the masking tape from the induction ports. Fit new gaskets.
2. Fit the intermediate shaft in position between the carburetors, see Fig. 30. Make sure that the protective plate is in good condition and that the sealing surfaces are clean.
3. Fit both the carburetors, with intermediate shaft, at the same time. Tighten the nuts and connect up the controls and lines.
4. Carry out necessary carburettor setting adjustments see "Carburettor settings after fitting".

Carburettor settings after fitting (synchronizing)

In order to enable the carburettor settings to be carried out correctly, the following points must be first checked and adjusted if necessary:

Valve clearance, sparking plugs, compression, dwell angle of contact breakers, ignition timing.

If these adjustments are carried out carefully, subsequent re-adjustment is very seldom necessary.

At certain intervals, for example, when replacing the air cleaners, it is, however, advisable to remove and clean the vacuum chamber and piston thoroughly.

The floatchambers should also be cleaned at the same time. This can easily be done after the float-chamber covers have been removed.

BASIC ADJUSTMENT (O-SETTING) OF CARBURETTORS

The basic adjustment should always be the starting point for synchronization.

1. Place a 0.5 mm feeler gauge at "A" Fig. 30 between the lever and its abutment. Screw out the fast idling and idling screws (2, Fig. 31) so that the throttle flap is fully closed.

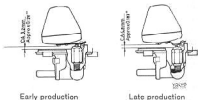


Fig. 27. Checking the float level

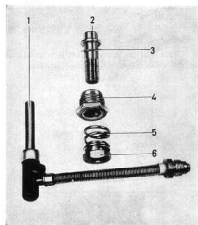


Fig. 28. A dismantled jet

- | | |
|---------------------------------|------------------|
| 1. Jet with fuel line, complete | 4. Lock nut |
| 2. Jet sleeve | 5. Spring |
| 3. Washer | 6. Adjusting nut |

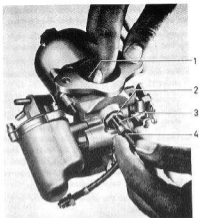


Fig. 29. Centering the jet

1. Lower part of air valve
2. Lock nut
3. Jet sleeve
4. Jet

2. Loosen the lock nuts (3 and 9, Fig. 30) and press the outer end of the levers (2, 8) on the

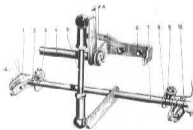


Fig. 30. Intermediate shaft and levers

A — clearance between abutment and lever

- | | |
|-----------------------------------|------------------------------------|
| 1. Lever on throttle flap spindle | 6. Bracket |
| 2. Lever on intermediary shaft | 7. Intermediary shaft |
| 3. Lock nut | 8. Lever on intermediary shaft |
| 4. Control shaft | 9. Lock nut |
| 5. Link | 10. Lever on throttle flap spindle |

intermediate shaft carefully downwards so that the pins just touch the lower tooth on the throttle flap spindle levers (1, 10).

N.B. Do not press so hard that the throttle flap is influenced. Tighten the nuts (3, 9) in this position. When tightening, note that the end float of the shaft should be equally distributed in both directions and that there is a small axial clearance between the levers on the intermediate shaft and the throttle flap spindle levers. The intermediate shaft must not be held, for instance, as a result of the levers (2, 8) being fitted too close to the carburetors.

3. Remove the feeler gauge. Then check by lifting the lever at "A" that both throttle flaps are actuated simultaneously.
4. Screw in the idling screws (2, Fig. 31) so that they just touch the throttle levers when the throttles are closed. Then screw the idling screws in a further 1/2 turn.
5. Roughly adjust the jet height position by first screwing up the adjuster nut to the upper stop position and then screw it down again 1 1/2 turns. Adjust both carburetors in the same manner.

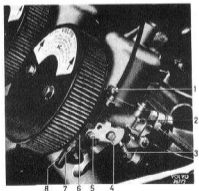


Fig. 31. Controls

- | | |
|--|------------------------------------|
| 1. Attachment for choke control outer casing | 5. Locking screw for choke control |
| 2. Idle adjusting screw | 6. Lock nut |
| 3. Fast idle adjusting screw | 7. Adjusting nut |
| 4. Lever | 8. Jet |

6. Fill the carburettor damping cylinders with oil. Use hydraulic oil ATF, type A. Fill only the centre spindle of the air valve, not the part above it.

SYNCHRONIZING

Connect a revolution counter. Start and run the engine warm.

1. Adjust idling speed on B 18 B to between 600–800 r.p.m. and for B 18 D 500–700 r.p.m. with both idling screws. Check with a synchro test that the stream of induction air to both carburettors is the same. Make sure that the synchro test is fitted so that its opening corresponds with the throats of the carburettors. Turn the synchro test throttling washer until a suitable register for its piston is achieved.
2. Adjust the idling screws until the synchro test shows the same register for both carburettors (adjust both screws so that the idling speed is withheld).
3. Screw the adjuster nut for the fuel jet slowly downwards until the highest r.p.m. is reached as per the revolution counter. Then screw the nut a further hex flat downwards.
4. Repeat the procedure with the other carburettor.
5. Lift the air valve for the other carburettor with the pin and check the fall off in engine speed.
6. Repeat the procedure with the other carburettor.
7. If adjustment is correct, the fall off in speed should be approximately 100–150 r.p.m. in both cases.
If the speed falls off too much when lifting, for example, the rear carburettor valve, adjust the front carburettor to a somewhat richer mixture, which is achieved by screwing the adjusting nut downwards.
8. Check and adjust if necessary the idling speed with the aid of the synchro test as per point 2.
9. Fit the air cleaners and test run the car. During test running, carry out a new "pin test" and any adjustment necessary.

Adjustment of choke control and fast idling

The fast idling adjustment described below is a normal setting. The setting can also be varied to suit different requirements and temperatures. In very cold weather it may be advisable to adjust

the fast idle screw so that it contacts the idling cam earlier than in the setting described below.

Adjustment must always be carried out in such a way that both carburettors are simultaneously influenced by the control.

1. Pull out the choke control on the dashboard about 15 mm (5/8").
2. Loosen the screw (5, Fig. 31) for the control cable. Lift the lever so much that the jet just starts to go down.
3. Adjust the fast idle screw (3) so that it just touches the fast idle cam on the lever (4) when the jet starts to be influenced as described in the previous item. Tighten the locking screw for the control cable in this position.
4. Carefully adjust the other carburettor in the same manner.
5. Check by pulling out the control that both carburettors are simultaneously influenced. This is most easily carried out by pulling out the control about 20 mm (13/16") and then carefully watching the jets go down.
Adjust the setting if the jets do not go down equally.

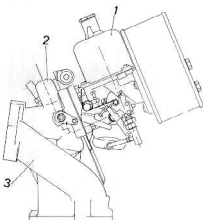


Fig. 32. Carburettor, exhaust emission control

1. Carburettor
2. Induction manifold
3. Exhaust manifold

EXHAUST EMISSION CONTROL SYSTEM

Checking the carburetors

Check that the secondary throttles are centered and that they can be turned without chafing. Check the position of the levers "A" in Fig. 33. When the secondary throttle is closed, the distance open "A" between the lever spindle and the inlet manifold flange should be 3.5 mm (0.15"). Check that the rubber seal (8, Fig. 35) is not damaged to ensure that its inner edge seals properly against the inlet manifold. When fitting a new seal, make sure that the seal is not damaged by the sharp edges of the spindle and that it is fitted so that the dimension "B" is 4.5–5.0 mm (0.18–0.20") (see Fig. 35).

Rough jet adjustment

Starting with the top position of the jet (as described above), screw it down so far that it just contacts the suction chamber when this is resting against the bridge. From this position screw the adjuster nut down 16 hex flats.

Checking the suction chamber valve stroke

With the carburettor in the same position as when "centering the jet" as described above, move the

suction chamber piston to its upper position. It should be possible to move the valve easily without jamming. When the valve is released, it should return at an even speed and strike against the bridge with a clearly audible noise.

Rough setting of idling screw

Check that the end of the screw is free from burrs. Screw in the idling screw until it just contacts the lever. Then screw it in a further 1 1/2 turns.

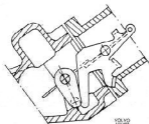


Fig. 34. Throttle fully open (high output)

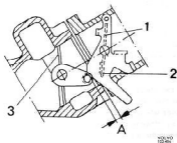


Fig. 33. Throttle position at low output, secondary throttle closed

"A" = 3.5 mm (0.15")

1. Primary throttle
2. Valve
3. Secondary throttle

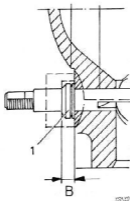


Fig. 35. Checking the seal

"B" = 4.5–5.0 mm

(0.18–0.20")

1. Rubber seal

Setting the fuel/air mixture and idling speed

First check the oil level in the damper cylinder. This should be filled to 1/4" from the upper edge with ATF Type A oil. Also check to make sure that the engine is in general correctly adjusted (valve clearance, timing, etc.). **The mixture setting must be made at room temperature (20° C: 68° F) at approximately 1–3 minutes after the engine has reached its normal operating temperature (by running at idling speed).**

The setting should be made with a CO-meter according to method "A" described below, but if necessary it may also be made in accordance with method "B" below.

A. Setting with CO-meter

1. Connect a tachometer and the CO-meter. Run the engine to operating temperature at idling speed.
2. Set the idling speed to 850 r.p.m. so that both carburetors have the same intake noise.
3. From the basic setting (16 flats down on each carburettor) adjust the fluid air mixture on the rear carburettor until a CO-content of 3.0–3.5 % is obtained.
4. If necessary, adjust the idling speed to:
800–850 r.p.m. with mechanical gearbox.
700–750 r.p.m. with automatic transmission.

Choke-fast idle adjustment

1. Adjust the choke control so that the jet of the front carburettor begins to drop when the dashboard control is drawn out 20 mm (3/4") and the rear carburettor jet begins to drop when the control is drawn out 30 mm (1 1/8").

(For the P 1800 15 and 20 mm resp. (5/8" and 3/4" resp.).

2. The fast idle speed adjusting screws are adjusted with the choke control fully pushed in so that the distance between the screw and

the cam is 0.1–0.3 mm (0.004–0.012") for the front carburettor and for the rear carburettor 0.3–0.0 (0.012–0.020").

After adjustment has been carried out, the car should be test-driven and a further check on the fuel/air mixture ("the pin test") be made **outdoors**. This is particularly important during wintertime with a view to the low temperature outside. The wide variations in temperature (warm workshop – minus temperature outside) have an influence on the fuel/air mixture.

Adjusting the accelerator pedal

The length of the long vertical thrust rod from the control on the body is adapted so that there is a clearance of 1 mm (0.04") between the throttle lever tab and the full throttle stop on the carburetors, when the accelerator pedal is fully depressed. At full depression of the pedal, the force from the driver's foot will be absorbed by the toe-plate without unnecessary loading of the accelerator pedal.

AIR CLEANERS

Replacement of air cleaners

The only servicing procedure necessary under normal conditions is to replace both air cleaners by new units after every 20 000 km (12 000 miles). The used cleaners should be scrapped.

If the car is run on dusty roads and in the case of areas with particularly contaminated air, the cleaners should be replaced more often, approximately every 10 000 km (6 000 miles).

No other forms of cleaning are to be carried out.

The car should not be run without air cleaners since the carburetors are dependent on the resistance which occurs when the air passes through the air cleaner cartridges. A high rate of wear occurs if the air is not cleaned.

1. Remove the air cleaners by unscrewing the attaching screws.
2. Make sure that the gaskets are turned the right way and then fit the new air cleaners. If the gaskets are turned the wrong way, they block

the ventilation holes for the suction chamber valve and the carburetors cannot function properly.

Replacement of air cleaner insert, right-hand drive car

The air cleaners fitted to P 120 cars with right-hand drive have replaceable inserts. The replacement intervals are the same as those for air cleaners with paper inserts.

Remove the wing nut, lift off the casing and fit a new insert. Make sure that the contact surface for the new insert is clean. Be careful to en-

sure that no dirt gets into the air intake or onto the inside of the insert.

Replacing the insert, car fitted with preheating device

In the case of an air cleaner with a preheating device, the paper insert should be changed after every 40 000 km (25 000 miles) (more frequently under particularly dusty conditions).

Loosen the clip, lift off the upper part of the air cleaner and replace the insert.

NOTE: The rubber seal must be turned inwards. Replace the upper section and clip.



Fig. 36. Replacing the air cleaner insert on and air cleaner fitted with air preheating device

1. Upper part
2. Cartridge
3. Lower part

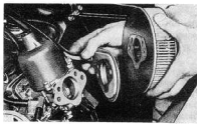


Fig. 37. Replacing the air cleaner (early production)

TRACING FAULTS

FAULT

CAUSE

REMEDY

The engine stops or runs very unevenly at idling speed

Faulty spark plug or suppressor.
Air leakage at carburettor connection.
Idling speed too low.

Uneven carburettor adjustment.

Check or replace the spark plug and suppressor.
Check tightness. Replace effective washers.
Increase idling speed and check that the induction sound is equally strong on both carburettors.
See "Carburettor adjustment after fitting".

The engine runs unevenly at low speed

Metering needle and jet worn.

Replace needle and jet.

Uneven running with cold engine and choke being used

The carburettors are not influenced to the same extent by the choke.

Adjust the setting. See "Adjustment of choke control and rapid idling."

Engine operates jerkily during acceleration

Dirty insulators on spark plugs.
Faulty spark plug.
Dirty, defective or moist distributor cap.
Defective or moist cables.
Insufficient oil in carburettor damping cylinders or oil too thin.
Dirt in carburettors.

Fuel/air mixture too lean.
Fuel pump defective, feeds insufficient fuel.

Clean the insulators.
Check spark plugs and replace if necessary.
Remove and clean or replace distributor cap.
Check, clean or replace cables. See also Part 3.
Add oil of the correct quality and viscosity.

Remove floatchamber covers and clean float-chambers.

Check fuel pump pressure and capacity.

Low engine output

Air cleaners blocked.
Poor fuel/octane rating too low.
Faulty ignition setting.

Faulty and uneven carburettor settings.

Faulty valve clearances.
Low compression on one of the cylinders.

Seizing piston.
Seizing wheel bearings or faultily adjusted brakes.

Fit new air cleaners.
Check fuel quality, change to correct fuel.
Adjust the ignition setting at rapid idling using a stroboscope. See "Ignition setting".
Check and adjust carburettor settings. See "Carburettor settings after fitting".
Check and adjust valve clearances.
Measure the compression pressure. In case of low values, remove cylinder head for closer examination of engine.
Remove cylinder head for investigation.
See Parts 5 and 7.

Knocking from valve mechanism

Valve clearances too large.
Worn or damaged parts in valve mechanism.

Adjust valve clearances.
Recondition or replace parts where required.

Heavy regular knocking, more obvious during loading

Worn main and big-end bearing or worn pistons and gudgeon pins.

Localise sound by short circuiting spark plugs, one after another.
Then disassemble to required extent for inspection of bearings and pistons.

Low oil pressure

Low pressure at idling speed.

When the engine has been run hard and then been allowed to run at lowest idling speed, normal pressure is fairly low.
Change the oil cleaner.

Blocked oil filter (engine must run longer than usual after starting before pressure is attained).
Faulty oil pressure contact, pressure gauge or piping.
Faulty spring for relief valve or worn pump.
One or more bearings worn.
Considerable general wear.

Measure pressure using control gauge.
Replace faulty contact, pressure gauge or piping.
Remove oil pump. Check spring and pump.
Examine and replace bearing shells.
Replace or recondition engine.

Heavy oil consumption

Hard driving.
Leakage at joints.
Worn valve guides.
Worn piston rings.

No remedy necessary. Oil consumption can increase slightly in the case of very hard driving.
Tighten screws, replace defective or poor gaskets and washers.
Do not add more oil until the level is close to the lower mark on the dipstick.
Recondition valve system.
Replace piston rings.

Heavy fuel consumption

Hard highway driving or much driving in town.
Blocked air cleaner.
Carburettor flooding.
Faulty carburettor setting, fuel/air mixture too rich.
Defective suppressors on spark plugs, faulty contact breakers.
Faulty dwell angle and ignition timing.

No remedy necessary. Normal under such conditions.
Replace air cleaner.
Check carburettors and replace float valves if necessary.
Also check fuel pump pressure.
Adjust the setting.
Replace spark plug suppressors. Adjust distributor.
Adjust dwell angle and ignition timing.

Engine becomes abnormally warm

Insufficient coolant.
Faulty temperature gauge.

Add coolant.
Check gauge or replace.

Fuel with low octane rating (knocking).
 Faulty thermostat.
 Faulty ignition setting.
 Faulty carburettor setting (fuel/air mixture too lean).
 Cooling system blocked.
 Fan belt insufficiently tensioned.

Fill up with fuel of correct octane rating.
 Replace thermostat.
 Adjust ignition setting.
 Adjust carburettor setting.
 Clean cooling system.
 Adjust tension.

Coolant losses

Hose joints leaking.
 Faulty radiator cap.
 Defective cylinder head gasket (oil in coolant).

Check hoses and clips, replace if necessary.
 Replace radiator cap.
 Replace cylinder head gasket.

Engine speed does not go down to idling. (In case of engines with exhaust emission control)

Control system chafing.
 Leaking valve in primary flap.¹⁾

Clean and lubricate.
 Replace flap.

¹⁾ First check that the valve clearances, ignition timing and carburettor settings are correct. If they are faulty, this influences the vacuum and also the function of the flap valve.