Chapter 3
Fuel, exhaust and emission control systems

For modifications, and information applicable to later models, see Supplement at end of manual

Contents

Specifications

Air cleaner

Type	Renewable paper element, with temperature control device on later models

Fuel pump

Type:	
Electric pump	SU AUF 201
Mechanical pump	SU AUF 700 or AUF 800

Carburettor data

Mini 850 Saloon and variants, 848 cc

	1969-72	1972-74	1974-76	1976 on
Carburettor type	SU HS2	SU HS2	SU HS4	SU HS4
Piston spring	Red	Red	Red	Red
Jet size	0.090 in (3 mm)	0.090 in (3 mm)	0.090 in (3 mm)	0.090 in (3 mm)
Needle:				
Standard	EB	AAV	ABS	ADH
Rich	M	–	–	–
Weak	GG	–	–	–
Exhaust emission (%CO)	–	3.5 to 4.5	3.5 to 4.5	3 to 4.5
Idle speed	500 rpm	800 rpm	800 rpm	750 rpm
Fast idle speed	900 rpm	1200 rpm	1200 rpm	1200 rpm

Mini Clubman and Mini 1000 Saloon and variants, manual transmission, 998 cc, up to 1974

	1969-72	1972-74
Carburettor type	SU HS2	SU HS2
Piston spring	Red	Red
Jet size	0.090 in (3 mm)	0.090 in (3 mm)
Needle:		
Standard	GX	AAV
Rich	M	–
Weak	GG	–
Exhaust emission (%CO)	–	3.5 to 4.5
Idle speed	500 rpm	800 rpm
Fast idle speed	900 rpm	1200 rpm

Mini Clubman and Mini 1000 Saloon, automatic transmission, 998 cc, up to 1974

	1969-74
Carburettor type	SU HS4
Piston spring	Red
Jet size	0.090 in (3 mm)
Needle:	
Standard	AC
Rich	MI
Weak	HA
Idle speed	650 rpm
Fast idle speed	1050 rpm

Mini Clubman and Mini 1000 Saloon and variants, manual and automatic transmission, 998 cc, 1974 on

	1974-76	1976-78	1978 on
Carburettor type	SU HS4	SU HS4	SU HS4
Piston spring	Red	Red	Red
Jet size	0.090 in (3 mm)	0.090 in (3 mm)	0.090 in (3 mm)
Needle	ABX	ADE	ADE
Exhaust emission (%CO)	3.5 to 4.5	3 to 4.5	3
Idle speed	750 rpm	750 rpm	750 rpm
Fast idle speed	1200 rpm	1250 rpm	1250 rpm

Mini 1000 (Canada)

	1970-73	1973-77	1977 on
Carburettor type	SU HS4	SU HS4	SU HS4
Piston spring	Red	Red	Red
Jet size	0.090 in (3 mm)	0.090 in (3 mm)	0.090 in (3 mm)
Needle	AAG	ABJ	ADD
Exhaust emission (%CO)	4.5	4.5	4.5 to 5.5
Idle speed	800 rpm	850 rpm	750 to 850 rpm
Fast idle speed	1250 rpm	1250 rpm	1150 to 1350 rpm

Mini Clubman 1100, 1098 cc

	1974 on
Carburettor type	SU HS4
Piston spring	Red
Jet size	0.090 in (3 mm)
Needle	ABP
Exhaust emission (%CO)	3 to 4.5
Idle speed	750 rpm
Fast idle speed	1150 to 1300 rpm

Mini Cooper S Mk III, 1275 cc

	1969 on
Carburettor type	Twin SU HS2
Piston spring	Red
Jet size	0.090 in (3 mm)
Needle:	
Standard	M
Rich	AH2
Weak	EB
Idle speed	600 rpm
Fast idle speed	1000 rpm

Mini 1275 GT, 1275 cc

	1969-72	1972-76	1976-77	1978 on
Carburettor type	SU HS4	SU HS4	SU HS4	SU HS4
Piston spring	Red	Red	Red	Red
Jet size	0.090 in (3 mm)	0.090 in (3 mm)	0.090 in (3 mm)	0.090 in (3 mm)
Needle:				
Standard	AC	AAV	ABB	AAT
Rich	BQ	–	–	–
Weak	HA	–	–	–
Exhaust emission (%CO)	–	3.5 to 4.5	3 to 4.5	3 to 4
Idle speed	650 rpm	800 rpm	850 rpm	750 rpm
Fast idle speed	1050 rpm	1200 rpm	1300 rpm	1300 rpm

Carburettor dashpot (all models)

Oil type/specification	Multigrade engine oil, viscosity SAE 20W/50, 10W/40, or 10W/30 (Duckhams QXR, Hypergrade, or 10W/40 Motor Oil)
Oil level	0.5 in (13 mm) above piston rod

Fuel tank capacity

Saloon models except Cooper S Mk III and 1275 GT	5.5 gallons (25 litres) – 7.5 gallons (33 litres), later models
Estate, Van and Pick-up	6.0 gallons (27.3 litres)
Cooper S Mk III (twin fuel tanks)	11.0 gallons (50 litres)
1275 GT	7.5 gallons (34 litres)

1 General description

The fuel system comprises a fuel tank, an electric or mechanical fuel pump and a variable choke carburettor.

The fuel tank is located in the luggage compartment on Saloon models, and beneath the rear floor on the Estate, Van and Pick-up variants. On Cooper S versions twin fuel tanks are used, these being positioned on either side of the luggage compartment.

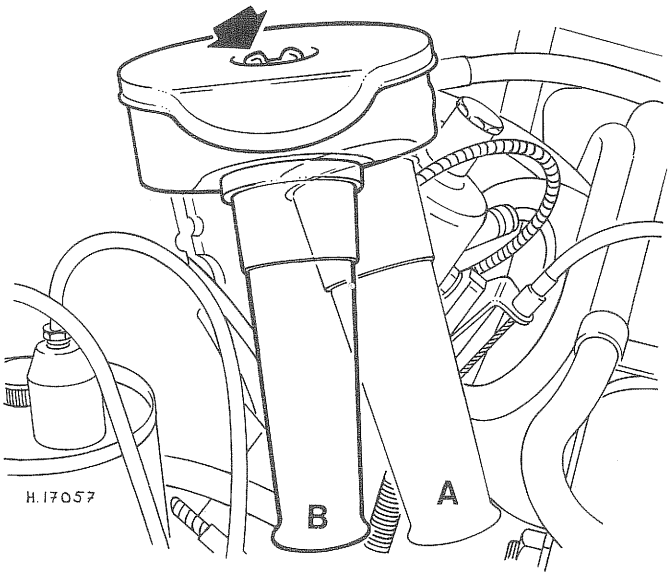


Fig. 3.1 The air cleaner fitted to early models (Sec 2)

A Winter position
B Summer position
Air cleaner retaining wing nut arrowed

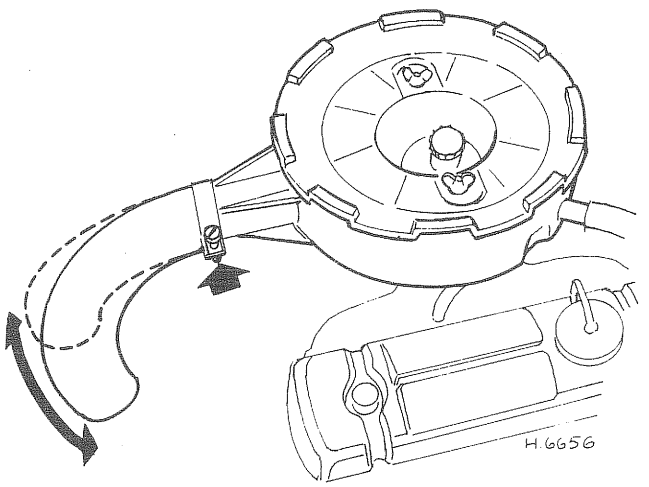


Fig. 3.2 The air cleaner fitted to automatic transmission and certain manual transmission models (Sec 2)

Adjustable intake spout clamp bolt arrowed

A number of the earlier vehicles covered by this manual are equipped with an SU electric fuel pump which is mounted on the left-hand member of the rear subframe. All later Mini models utilize a mechanical fuel pump bolted to the rear of the engine and operated by an eccentric on the camshaft.

A variable choke carburettor of SU manufacture is fitted to all models. Manual transmission versions manufactured up to 1974 utilize a single SU HS2 unit, the exception to this being the Cooper S model which incorporates a twin carburettor installation. Later manual and all automatic transmission vehicles are equipped with the larger SU HS4 carburettor.

Certain export models are fitted with emission control equipment to reduce the level of harmful emissions in the exhaust gases. A brief description will be found in Section 30.

2 Air cleaner – removal and refitting

All models except Cooper S

1 Undo and remove the single wing nut and washer on early models, or the twin wing bolts and washers on later models, securing the air cleaner to the carburettor (photos).

2 If the air cleaner is retained by a single wing nut lift off the air cleaner top cover. Detach the rocker cover hose, then lift the air cleaner body off the carburettor, tip it up at the front and slide it sideways until it is clear of the long retaining stud and can be lifted away. Recover the sealing ring (photos).

3 If the air cleaner is retained by two wing nuts, detach the hot air duct (where fitted) and then lift the air cleaner body off the carburettor (photos).

4 With the air cleaner removed from the engine, recover the rubber sealing ring if it stayed behind on the carburettor flange (photo).

5 Lift off the air cleaner cover and withdraw the paper element. On the later type moulded plastic air cleaners the cover is removed by prising it off with a screwdriver inserted in the slots on the periphery of the cover (photos).

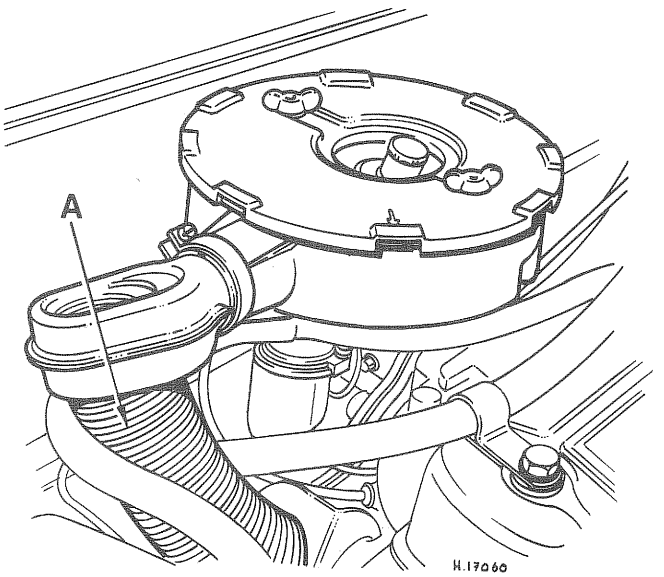
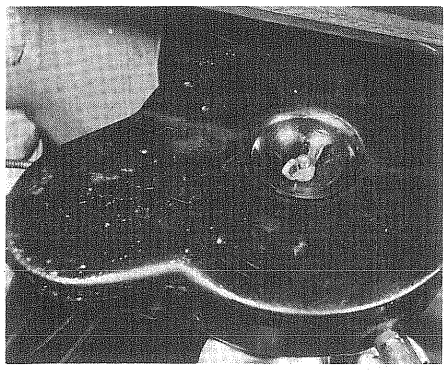
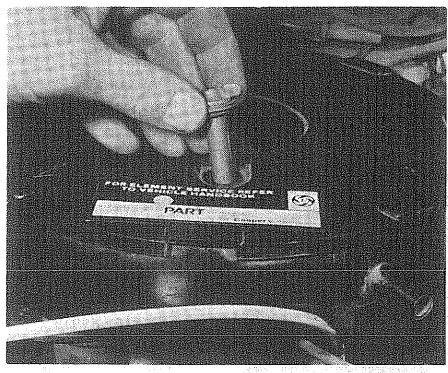


Fig. 3.3 The air cleaner fitted to all later models (Sec 2)

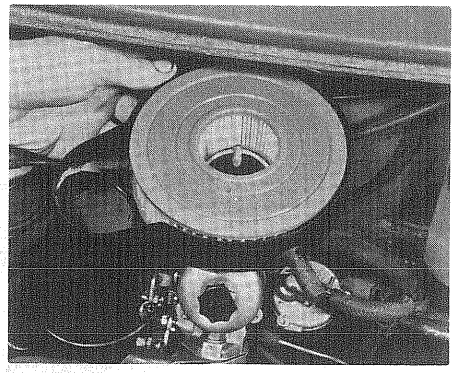
A Hot air intake duct



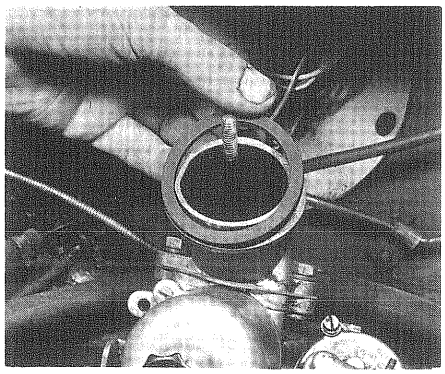
2.1a Remove the single wing nut on early models...



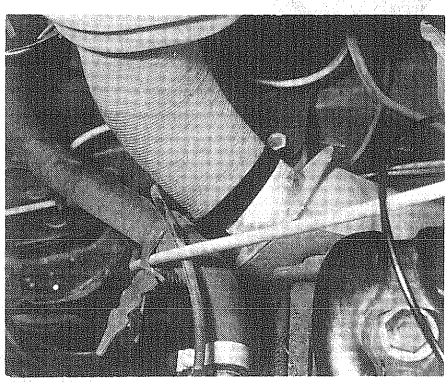
2.1b ...or the two wing bolts on later models



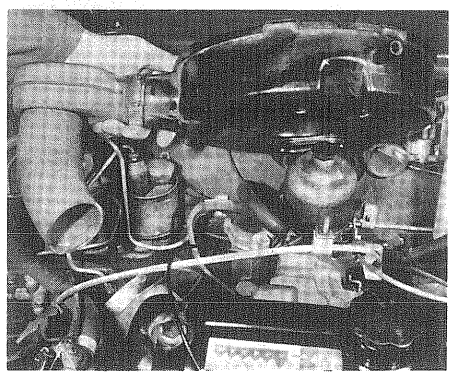
2.2a On early models lift off the top cover and withdraw the air cleaner body from the carburettor



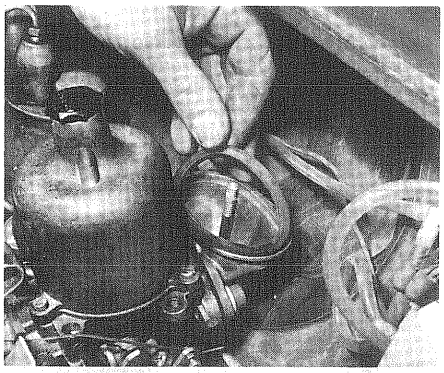
2.2b Recover the sealing ring



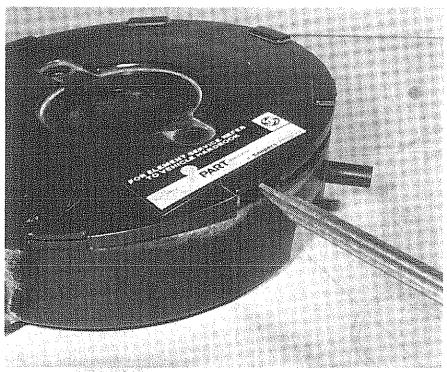
2.3a On later models detach the hot air duct...



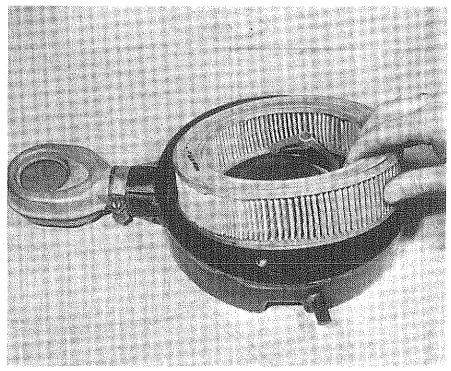
2.3b ...lift off the air cleaner body...



2.4 ...and recover the sealing ring



2.5a To remove the later type element, prise up the cover...



2.5b ...and lift the element out

6 Thoroughly clean the inside of the air cleaner body. Do not attempt to clean the paper element but renew it at the recommended service intervals.

7 Refitting the air cleaner is the reverse sequence to removal. Make sure that where an alignment arrow is stamped on the top cover, it is pointing toward the location lug on the air cleaner body (photo). Ensure also that the rubber sealing ring is in position before refitting the air cleaner.

8 If the air cleaner body incorporates an adjustable air intake spout, this should be positioned adjacent to the exhaust manifold in winter and away from it in summer.

Cooper S models

9 Undo and remove the two wing bolts and washers and lift off the air cleaner top cover. Lift out the paper elements and thoroughly clean the inside of the air cleaner body.

10 Do not attempt to clean the paper elements but renew them at the recommended service intervals.

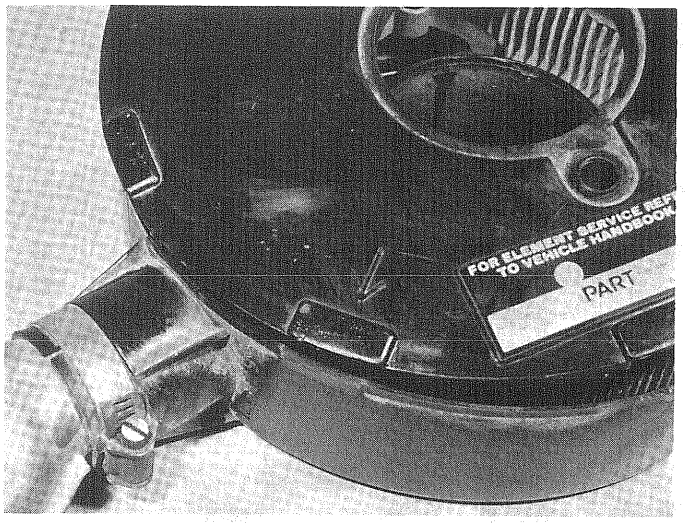
11 The air cleaner body may be removed if necessary after disconnecting the engine breather pipe and the throttle return spring. Take care not to lose the two rubber sealing washers from the carburettor flanges.

12 Refitting the air cleaner and elements is the reverse of the removal procedure.

3 Electric fuel pump – general description

The SU electric fuel pump consists of a long outer body casing housing the diaphragm, armature and solenoid assembly, with at one end the contact breaker assembly protected by a bakelite cover, and at the other end a short casting containing the inlet and outlet ports, filter, valves, and pumping chamber. The joint between the bakelite cover and the body casing is protected with a rubber sheath.

The pump operates in the following manner. When the ignition is switched on current travels from the terminal on the outside of the



2.7 The top cover on the later type air cleaner is refitted with the alignment arrow toward the locating lug

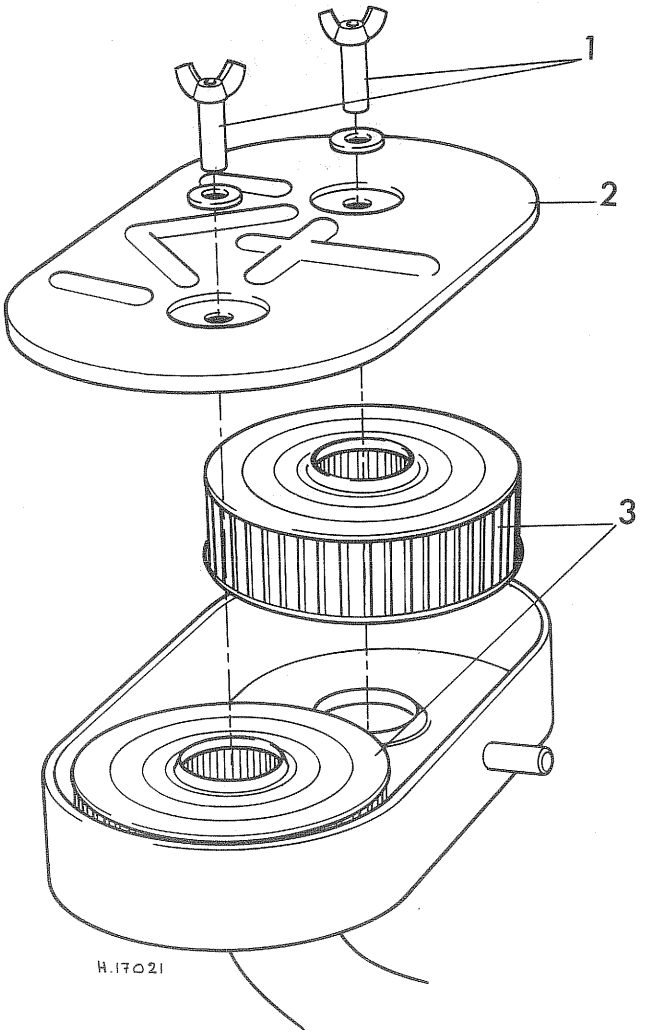


Fig. 3.4 The Cooper S air cleaner assembly (Sec 2)

1 *Wing bolts*
2 *Top cover*
3 *Elements*

bakelite cover, through the coil located round the solenoid core, which becomes energised. This acts like a magnet, drawing the armature towards it. The current then passes through the points to earth.

When the armature is drawn forward, it brings the diaphragm with it against the pressure of the diaphragm spring. This creates sufficient vacuum in the pump chamber to draw in fuel from the tank through the fuel filter and non-return inlet valve.

As the armature nears the end of its travel a 'throw-over' mechanism operates which separates the points so breaking the circuit.

The diaphragm return spring then pushes the diaphragm and armature forwards, into the pumping chamber, so forcing the fuel in the chamber out to the carburettor through the non-return outlet valve. When the armature is nearly fully forward the throw over mechanism again functions; this time closing the points and re-energising the solenoid, so repeating the cycle.

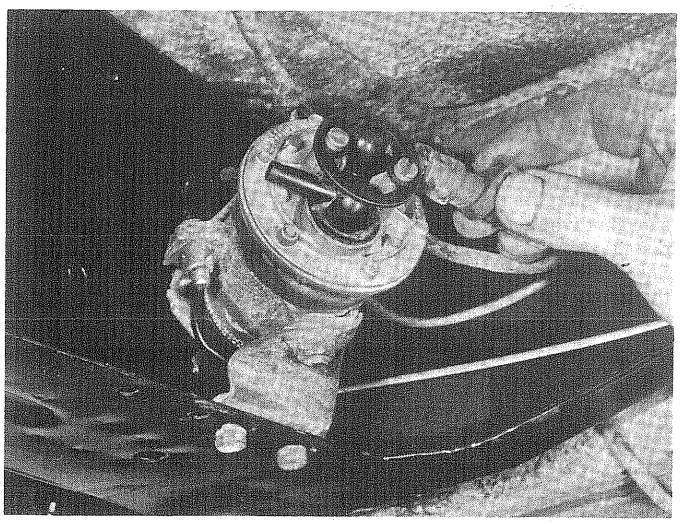
4 Electric fuel pump – removal and refitting

1 Jack up the rear of the car and support it on axle stands. Disconnect the battery earth terminal.
2 Working under the car, disconnect the earth lead and the electrical supply wire from their terminals on the pump body.
3 Prepare to squeeze the rubber portion of the petrol pipe leading from the tank with a self-gripping wrench or similar tool, to ensure that the minimum amount of fuel is lost when the inlet pipe is removed from the pump. Plug the end of the pipe with a bolt or metal rod of suitable diameter immediately it is disconnected.
4 Remove the inlet and outlet fuel pipes by undoing the retaining clip screws and easing the pipes off the pump nozzles (photo). Remove the vent pipe connector, if fitted, at this stage.
5 Undo and remove the two nuts, bolts and spring washers securing the pump bracket to the subframe and lift off the pump assembly, complete with bracket and clamp.
6 To separate the pump from the bracket, slacken the clamp bolt and slide the pump out of the clamp.
7 Refitting is the reverse sequence to removal, bearing in mind the following points:

(a) Arrows on the pump body indicate the correct locations of the inlet and outlet pipes. Ensure that these are fitted correctly and that the pump is installed with the outlet pipe at the top
(b) Ensure that the electrical leads, particularly the earth, are clean and that a correct connection is made

5 Electric fuel pump – dismantling

1 Prepare a clean uncluttered working surface and have some small jars or tins handy to store the small, easily-lost parts in.



4.4 Removing the fuel outlet pipe from the electric pump

2 Release the inlet and outlet nozzles, valves, sealing washers, and filter by unscrewing the two screws from the spring clamp plate which hold them all in place.
3 Mark the flanges adjacent to each other, and separate the housing holding the armature and solenoid assembly from the pumping chamber casting, by unscrewing the six screws holding both halves of the pump together. Take great care not to tear or damage the diaphragm, as it may stick to either of the flanges as they are separated.
4 The armature spindle, which is attached to the armature head and diaphragm, is unscrewed anti-clockwise from the trunnion at the contact breaker end of the pump body. Lift out the armature, spindle, and diaphragm, and remove the impact washer from under the head of the armature, (this washer quietens the noise of the armature head hitting the solenoid core), and the diaphragm return spring.
5 Slide off the protective rubber sheath and unscrew the terminal nut, connector (where fitted), and washer from the terminal screw, and remove the bakelite contact breaker cover.
6 Unscrew the screws which hold the contact spring blade in position and remove with the blade and screw washer.
7 Remove the cover retaining nut on the terminal screw, and cut through the lead washer under the nut on the terminal screw with a pocket knife.
8 Remove the two bakelite pedestal retaining screws, complete with

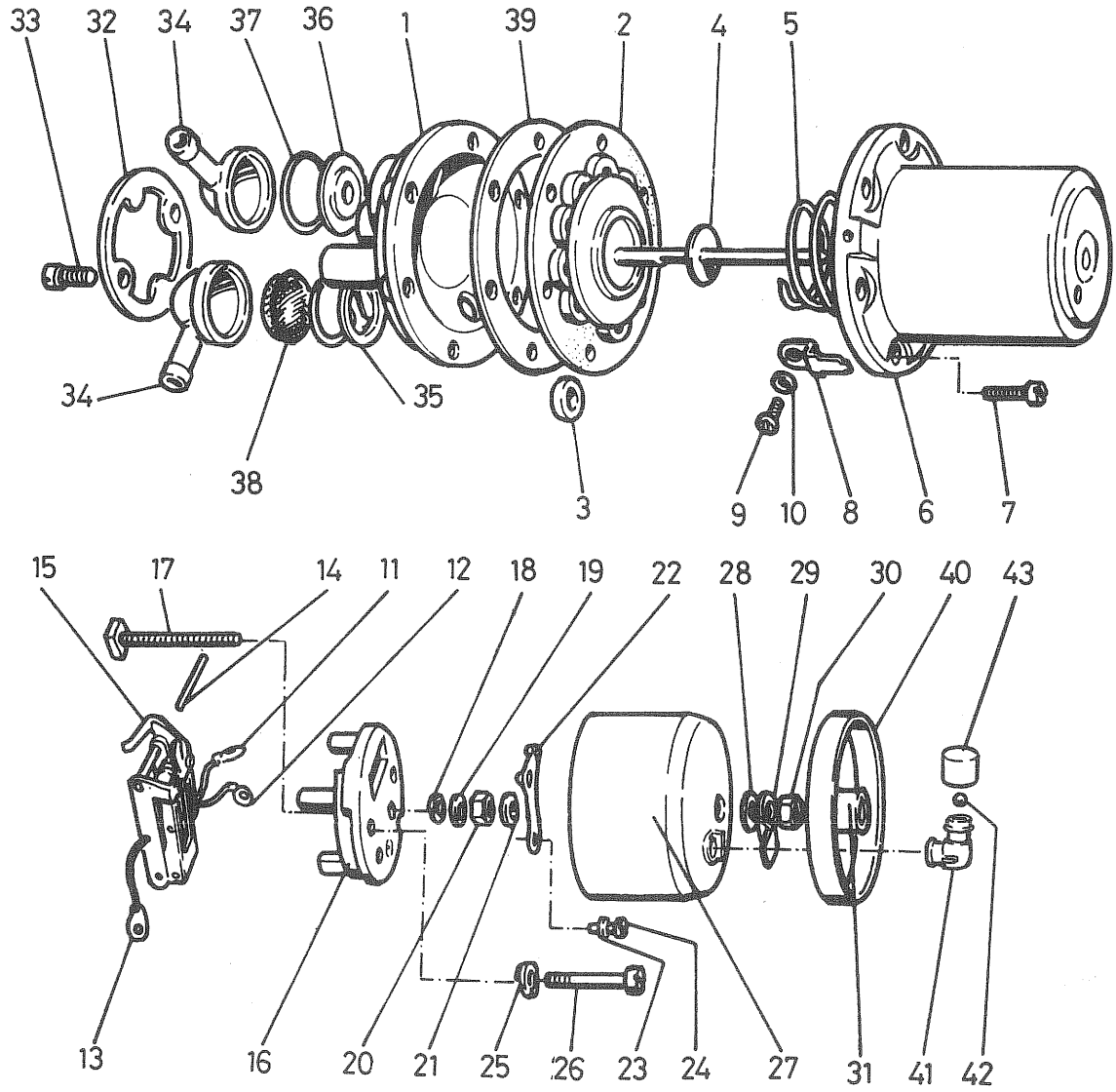


Fig. 3.5 Exploded view of the electric fuel pump (Sec 5)

1 *Pump body*
2 *Diaphragm*
3 *Roller*
4 *Washer*
5 *Spring*
6 *Coil Housing*
7 *Screw*
8 *Terminal*
9 *Screw*
10 *Washer*
11 *Terminal*
12 *Terminal*
13 *Terminal*
14 *Pivot pin*
15 *Rocker gear*
16 *Pedestal*
17 *Stud*
18 *Washer*
19 *Washer*
20 *Nut*
21 *Sealing washer*
22 *Contact blade*
23 *Washer*
24 *Screw*
25 *Washer*
26 *Screw*
27 *End cover*
28 *Washer*
29 *Connector*
30 *Nut*
31 *Sleeve*
32 *Clamp plate*
33 *Screw*
34 *Inlet and outlet nozzles*
35 *Inlet valve*
36 *Outlet valve*
37 *Sealing washer*
38 *Filter*
39 *Gasket*
40 *Sealing band*
41 *Ventilator valve*
42 *Valve ball*
43 *Sealing ring*

spring washers, which hold the pedestal to the solenoid housing. Remove the braided copper earth lead, and coil lead from the terminal screw.
9 Remove the pin on which the rockers pivot by pushing it out sideways, and remove the rocker assembly. The pump is now fully dismantled. It is not possible to remove the solenoid core and coil, and the rocker assembly must not be broken down, as it is only supplied on exchange as a complete assembly.

6 Electric fuel pump – inspection and servicing

1 Remove the filter as described in Section 5, and thoroughly clean it in petrol. At the same time clean the points by gently drawing a piece of thin card between them. Do this very carefully so as not to disturb the tension of the spring blade. If the points are burnt or pitted they must be renewed and a new blade and rocker assembly fitted.
2 Fuel starvation combined with rapid operation is indicative of an air leak on the suction side. To check whether this is so, undo the fuel line at the top of the carburettor float chamber, and immerse the end of the pipe in a jam jar half filled with petrol. With the ignition on and the pump functioning, should a regular stream of air bubbles emerge from the end of the pipe, air is leaking in on the suction side.
3 If the filter is coated with gum-like substance very like varnish, serious trouble can develop in the future unless all traces of this gum (formed by deposits from the fuel) are removed.
4 To do this soak the filter in a reasonable amount of water soluble paint stripper. Remove the filter and wash it thoroughly in running water. Dry with a non-fluffy cloth. Exercise great care when using paint stripper and follow the manufacturer's instructions.
5 With the pump stripped right down, wash and clean all the parts thoroughly in paraffin and renew any that are worn, damaged, or cracked. Pay particular attention to the gaskets and diaphragm.

7 Electric fuel pump – reassembly

1 Fit the rocker assembly to the bakelite pedestal and insert the rocker pivot pin. The pin is case hardened and wire or any other substitute should never be used if the pin is lost.
2 Place the spring washer, wiring tag from the short lead from the coil, a new lead washer, and the nut on the terminal screw, and tighten the nut down.
3 Attach the copper earth wire from the outer rocker immediately under the head of the nearest pedestal securing screw, and fit the pedestal to the solenoid housing with the two pedestal securing screws and lockwashers. It is unusual to fit an earth wire immediately under the screw head, but in this case the spring washer has been found not to be a particularly good conductor.
4 Fit the lockwasher under the head of the spring blade contact securing screw, then the last lead from the coil, and then the spring blade, so that there is nothing between it and the bakelite pedestal. It is important that this order of assembly is adhered to. Tighten the screw lightly.
5 The static position of the pump when it is not in use is with the contact points making firm contact, and this forces the spring blade to be bent slightly back. Move the outer rocker arm up and down and position the spring blade so that the contacts on the rocker or blade wipe over the centre line of the other points. When open, the blade should rest against the small ledge on the bakelite pedestal just below the points. The points should come into contact with each other when the rocker is halfway forward. To check that this is correct, press the middle of the blade gently so that it rests against the ridge with the points just having come into contact. It should now be possible to slide a 0.030 in (0.762 mm) feeler gauge between the rocker rollers and the solenoid housing. If the clearance is not correct bend the tip of the blade very carefully until it is.
6 Tighten down the blade retaining screw, and check that a considerable gap exists between the underside of the spring blade and the pedestal ledge, with the rocker contact bearing against the blade contact and the rocker fully forward in the normal static position. With the rocker arm down, ensure that the underside of the blade rests on the ledge of the pedestal. If not, remove the blade and very slightly bend it until it does.
7 Place the impact washer on the underside of the armature head, fit the diaphragm return spring with the wider portion of the coils against the solenoid body, place the brass rollers in position under the diaphragm and insert the armature spindle through the centre of the solenoid core, and screw the spindle into the rocker trunnion.
8 It will be appreciated that the amount the spindle is screwed into the rocker trunnion will vitally affect the functioning of the pump. To set the diaphragm correctly, turn the steel blade to one side, and screw the armature spindle into the trunnion until, if the spindle was screwed in a further sixth of a turn, the throw-over rocker would not operate the points-closed to points-open position. Now screw out the armature spindle four holes ($\frac{2}{3}$ of a turn) to ensure that wear in the points will not cause the pump to stop working. Turn the blade back into its normal position.
9 Reassembly of the valves, filters, and nozzles into the pumping chamber is a reversal of the dismantling process. Use new washers and gaskets throughout.
10 With the pumping chamber reassembled, refit it carefully on the solenoid housing, ensuring that the previously made mating marks on the flanges line up with each other. Screw the six screws in firmly.
11 Fit the bakelite cover and refit the shakeproof washer, Lucar connector, cover nut, and terminal knob to the terminal screw. Then, refit the terminal lead and cover nut, so locking the lead between the cover nut and the terminal nut.

8 Mechanical fuel pump – general description

A mechanical fuel pump is fitted to the majority of models covered by this manual. The pump is located on the rear left-hand side of the crankcase and is driven by an eccentric lobe on the camshaft.

The camshaft lobe operates the rocker lever, drawing the pump diaphragm downwards and thus creating suction on the fuel inlet pipe from the fuel tank. This draws fuel through the filter into the diaphragm chamber (upper body), via the two-way valve. The outer seat lifts to allow fuel to pass into the diaphragm chamber. The spring then takes over the return stroke and forces fuel back through the centre seat of the two-way valve (which now lifts) up through the central tube of the upper body through the outlet cover to the carburettor. When the carburettor float needle valve is closed against the pump delivery the diaphragm of the pump stays in the down position, line pressure holding the spring compressed. The rocker lever idles free in these instances. As soon as the needle valve opens, the pressure in the outlet line from the pump decreases and the normal fuel delivery continues.

The AUF 700 series fuel pump fitted to early models may be dismantled for overhaul or repair. The AUF 800 series pump fitted to later models is a sealed unit, and if its condition is suspect, it must be renewed as a complete assembly.

9 Mechanical fuel pump – removal and refitting

1 Disconnect the battery earth terminal.
2 To provide greater access, remove the air cleaner, referring to Section 2 if necessary.
3 Slacken the pipe clip screw on the outlet pipe connection and draw it off. Have a small container handy to collect what little fuel may drain from the pipe.
4 In all saloon models, if the tank is more than half full, the fuel will drain from the tank under gravity when the fuel pump inlet pipe is disconnected, so provide for this situation by fitting a suitable clip or bung in the pipe if necessary. On all other models the tank is below the pump level, so this problem will not occur. Slacken the pipe clip screw on the inlet pipe connection and draw it off.
5 Slacken the two nuts which hold the pump to the crankcase on two studs through the lower body.
6 Ease the pump away from the crankcase slightly and release the insulating block and its two sealing gaskets. If they are stuck, carefully prise them off the crankcase using a knife or thin screwdriver. Now lift off the pump, insulating block and gaskets.
7 Refitting the pump is the reverse sequence to removal bearing in mind the following points:

(a) Ensure that the mating faces of the pump and crankcase are thoroughly clean and dry
(b) Use new sealing gaskets on either side of the insulating block, but make sure that the original thickness is maintained otherwise the pump operation may be affected

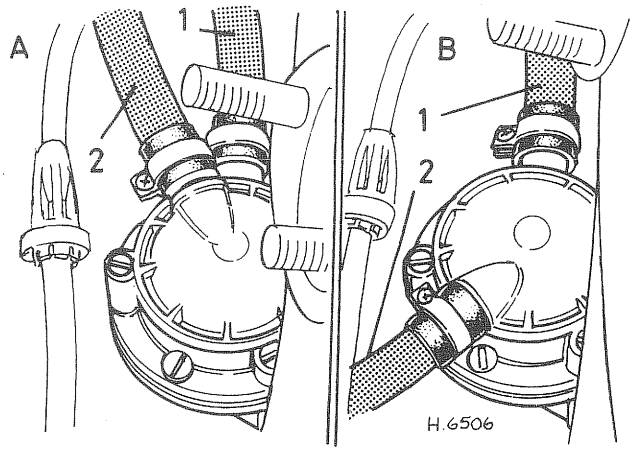


Fig. 3.6 AUF 700 mechanical fuel pump outlet pipe positions (Sec 9)

A 850, 1000 and 1100 models
B 1275 models
1 Inlet pipe
2 Outlet pipe

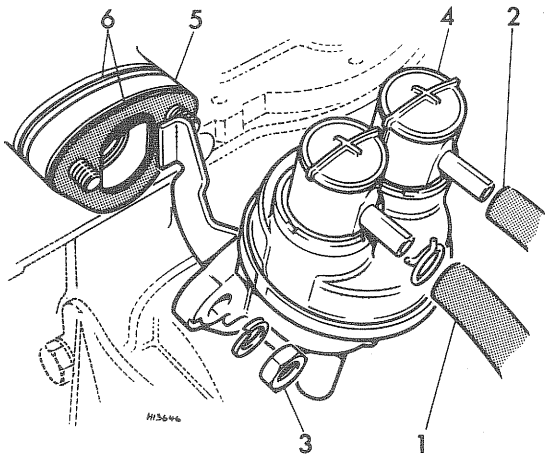


Fig. 3.7 AUF 800 fuel pump removal (Sec 9)

1 Inlet hose
2 Outlet hose
3 Nut
4 Pump body
5 Insulator
6 Gaskets

10 Mechanical fuel pump – dismantling

1 Clean any dirt off the whole of the assembly, and work on a bench covered with a clean sheet of paper.
2 Mark the relationship between the outlet cover, upper body and lower body, which must reassemble the same way.
3 Remove the three top cover retaining screws which clamp the lip of the cover.
4 The sealing ring should have come off with the outlet cover but if not, carefully lift it away from the upper body and remove the filter disc.
5 Remove the three screws holding the upper body to the lower body and lift it off.
6 Take out the inlet/outlet valve. This is a press fit and care is needed to avoid damage to the edge of the outer (inlet) seat.
7 To remove the diaphragm and spring, the rocker lever needs to be removed. Press the diaphragm and spring down sufficiently to take the pressure off the rocker lever pivot pin, which can be removed by a light tap with a long-nosed punch. Withdraw the lever from the diaphragm stirrup and watch for the spring flying out. Put a little oil on the diaphragm stirrup to prevent damage to the gland, and then carefully draw the diaphragm and spring from the lower body.
8 If the crankcase seal in the lower body requires renewal, it can be prised and hooked out. The seal will be damaged during removal so make sure that a new one is available before removing the old one.

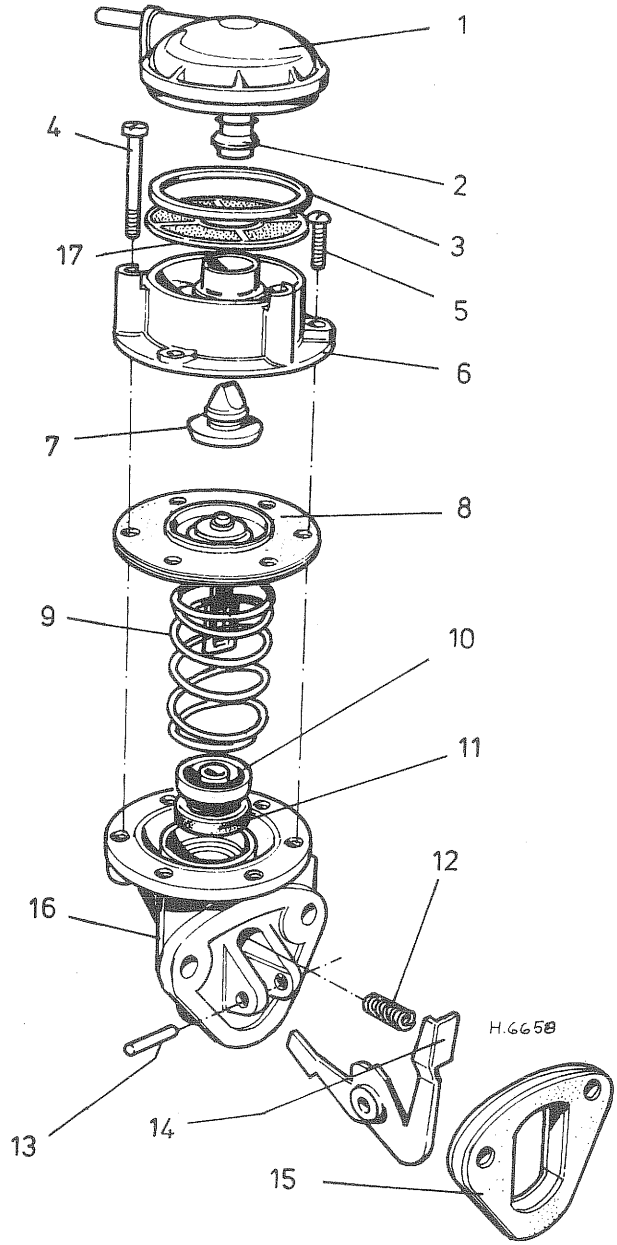


Fig. 3.8 Exploded view of the AUF 700 mechanical fuel pump (Sec 10)

1 Top cover
2 Outlet tube
3 Sealing ring
4 Screw
5 Screw
6 Upper body
7 Inlet/outlet valve
8 Diaphragm assembly
9 Diaphragm spring
10 Crankcase seal cup
11 Crankcase seal
12 Rocker lever return spring
13 Rocker lever pivot pin
14 Rocker lever
15 Insulating block
16 Lower body
17 Filter

11 Mechanical fuel pump – inspection and servicing

1 Ensure that the filter is clean and undamaged, check the diaphragm for signs of cracking and perforation and examine the seats of the inlet/outlet valve for chipping or wear on the seats. The sealing ring in the outlet cover is best renewed anyway, but does not have to be. If in doubt about any of these items, renew them.
2 Gum deposits should be cleaned off as described in Section 6.

12 Mechanical fuel pump – reassembly

1 Reassembly of the mechanical fuel pump is the reverse of the dismantling procedure but the following points should be noted.
2 If the crankcase seal is being renewed, press the seal carefully into the lower body using a drift or tube of suitable diameter. If a new diaphragm is being fitted, ensure that there are no sharp edges or burrs on the spindle or stirrup slot. Oil the spindle lightly and refit it with the stirrup slot positioned correctly for engagement with the rocker lever.
3 Refitting the rocker lever is best done with two pairs of hands. The diaphragm spring needs depressing sufficiently to introduce the end of the lever, and the lever in turn has to be positioned with its own return spring compressed. The pin is then installed. If another pair of hands is not available tie the diaphragm spring in the compressed position with a piece of string around the body, but do not put the string over the diaphragm.
4 Refit the inlet/outlet valve carefully ensuring that the groove registers in the housing and that the fine edge of the inlet valve seats evenly.
5 Place the upper body over the lower, lining up the screw holes with each other and the diaphragm, and replace the three short screws, holding the diaphragm flat by depressing the rocker lever. Do not tighten the short screws.
6 Refit the filter, sealing washer and outlet cover and the three long screws. Then tighten all six screws evenly.
7 To test the pump is functioning correctly, hold a finger over the inlet nozzle and operate the rocker lever through three full strokes, when suction should be heard and felt. Similarly for the outlet nozzle, one stroke of the rocker lever should give maintained pressure for 15 seconds. Never use compressed air for blowing through the pump as it is usually at a pressure far greater than the pump is designed to withstand.

13 SU carburettor – general description

The variable choke SU carburettor is a relatively simple instrument and is basically the same irrespective of its size and type. It differs from most other carburettors in that, instead of having a number of various sized fixed jets for different conditions, only one variable jet is fitted to deal with all possible conditions.

The carburettor comprises four main assemblies; these are the carburettor body, the piston and dashpot assembly, the jet assembly and the float chamber. Fuel is carried from the float chamber to the base of the jet head by a nylon pipe, the float chamber being secured to the carburettor body by a horizontally positioned bolt and spacing washer.

The operation of the carburettor is as follows. Air passing rapidly through the carburettor creates a slight vacuum or depression over the jet, causing fuel to be drawn into the air stream, thus forming the fuel/air mixture. The amount of fuel drawn from the jet depends on the position of the tapered carburettor needle. This moves up or down the jet orifice according to engine load or throttle opening, thus effectively altering the size of the jet. This allows the right amount of fuel to be delivered for the prevailing road conditions.

The position of the tapered needle in the jet is determined by engine vacuum. The shank of the needle is held at its top end in a piston, which slides up and down the dashpot, in response to the degree of manifold vacuum. This is directly controlled by the throttle. The piston is necessary so that the depression over the jet needed to draw fuel into the air stream, can be kept approximately constant. At slow engine speeds, the air entering the carburettor would not be travelling fast enough to create sufficient vacuum to draw fuel from the jet. By allowing the piston to partially restrict the opening through the carburettor, the incoming air is speeded up, causing an adequate depression over the jet.

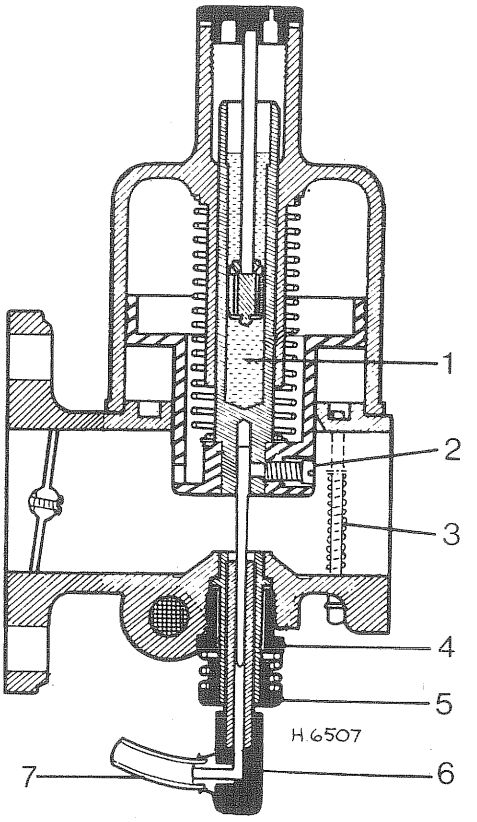


Fig. 3.9 Sectional view of carburettor (Sec 13)

1 Piston damper oil well
2 Needle securing screw
3 Piston lifting pin
4 Jet locking nut
5 Jet adjusting nut
6 Jet head
7 Fuel feed pipe

With the throttle fully open, the full effect of inlet manifold vacuum is felt by the piston, which has an air bleed into the carburettor venturi on the outside of the throttle. This causes the piston to rise fully, bringing the needle with it. With the throttle partially closed, only slight inlet manifold vacuum is felt by the piston (although on the engine side of the throttle, the vacuum is now greater), and the piston only rises slightly.

To prevent piston flutter, and to give a richer mixture when the accelerator is suddenly depressed, an oil damper and light spring are located inside the dashpot.

For cold starting, when fuel enrichment is necessary and very small amounts of air are drawn into the carburettor, actuation of the choke control causes the jet head to be lowered, thus effectively increasing the jet size.

The only portion of the piston assembly to come into contact with the piston chamber or dashpot is the actual central piston rod. All the other parts of the piston assembly, including the lower choke portion, have sufficient clearances to prevent any direct metal-to-metal contact, which is essential if the carburettor is to work properly.

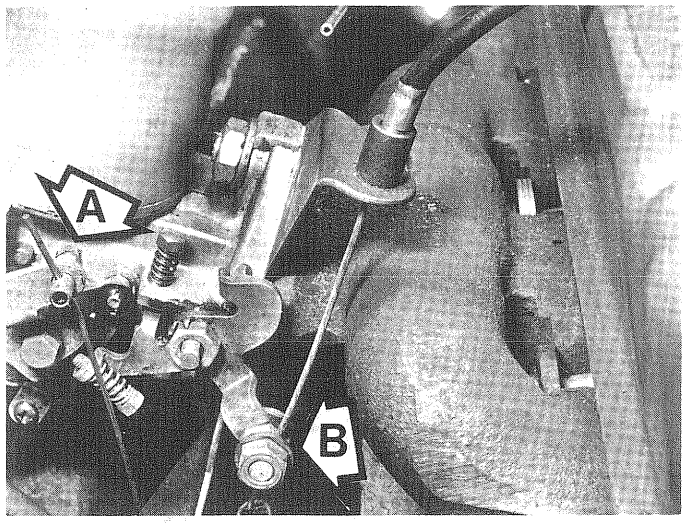
The correct level of the petrol in the carburettor is determined by the level of the float in the float chamber. When the level is correct, the float rises, and by means of a lever resting on top of it, closes the needle valve in the cover of the float chamber. This closes off the supply of fuel from the pump. When the level in the float chamber drops, as fuel is used in the carburettor, the float sinks. As it does, the float needle comes away from its seat so allowing more fuel to enter the float chamber and restoring the correct level.

14 SU carburettor – removal and refitting

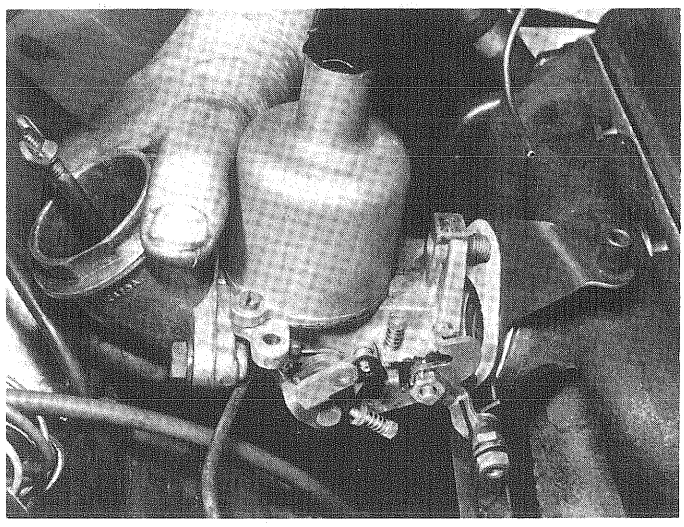
1 Remove the air cleaner from the carburettor as described in Section 2.
2 Disconnect the distributor vacuum advance pipe from the carburettor (where fitted).
3 Slacken the retaining clip screw and withdraw the fuel inlet pipe from the top of the float chamber. Plug the disconnected pipe with a bolt or metal rod of suitable diameter.
4 Disconnect the choke and accelerator cables from the carburettor linkages. Take care not to lose the small solderless nipple that retains the choke cable (photo).
5 Detach the throttle return spring from the bracket on the exhaust manifold clamp. On Cooper S models detach the throttle and throttle linkage return springs from the heat shield. On automatic transmission models detach the governor control rod fork end from the throttle lever.
6 Detach the engine breather hose from the carburettor (where fitted).
7 Undo and remove the two nuts which secure the carburettor(s) to the inlet manifold studs and recover the spring washers.
8 Lift the carburettor carefully off the inlet manifold (photo). If twin carburettors are being removed, lift off both carburettors together to avoid damaging the linkages that join the two carburettor spindles. These can be removed after the carburettors are lifted clear of the manifold studs.
9 Refitting the carburettor(s) is the reverse sequence to removal. Use new gaskets if necessary after ensuring that all traces of the old gasket are removed.
10 When refitting twin carburettors, ensure that the linkages joining the two spindles are in position, and that the operating forks are engaged in the slots on the carburettor spindles.

15 SU carburettor – dismantling

1 The SU carburettor is a straightforward unit to dismantle and service, but at the same time it is a delicate unit and clumsy handling can cause damage. In particular, it is easy to knock the finely tapering needle out of true, and the greatest care should be taken to keep all the parts associated with the dashpot in a safe place and scrupulously clean. Prepare a clean and uncluttered working area before starting the dismantling, and have some small containers handy to store the small, easily-lost parts.
2 Begin by removing the carburettor(s) from the car as described in Section 14. Thoroughly clean the outside of the carburettor in petrol or paraffin and wipe dry with a non-fluffy cloth.
3 Unscrew the piston damper assembly and remove it from the top of the dashpot.
4 Mark the base of the dashpot and carburettor body to ensure that on reassembly the dashpot is refitted in the same position. Now undo and remove the securing screws and lift off the dashpot.
5 Next lift off the piston spring and then carefully withdraw the piston and needle assembly from the carburettor body. Undo the small sunken retaining screw in the side of the piston and lift out the needle. On later types equipped with a spring-loaded needle, recover the guide collar from the needle, and the spring from the piston, after removing the needle assembly.
6 Undo and remove the three retaining screws and lift off the float chamber cover and gasket. The float may be released from the cover by gently tapping out the float hinge pin. The fuel cut-off needle valve can now be withdrawn from its seat in the cover and the needle seat unscrewed if required.
7 Unscrew the union nut securing the nylon fuel pipe to the base of the float chamber and carefully withdraw the pipe. Note the position of the gland, ferrule and rubber sealing washer on the end of the pipe and make sure that the rubber washer has not been left behind in the float chamber as the pipe is withdrawn. If so, hook it out carefully with a small screwdriver.
8 If there is a tamperproof cap in position around the jet adjusting nut at the base of the carburettor, prise it apart with a screwdriver and discard it.
9 Release the jet link lever return spring from the cam lever on the linkage.



14.4 Choke cable (A) and accelerator cable (B) attachments at the carburettor linkage (early type)


14.8 Removing the carburettor from the manifold (early type)

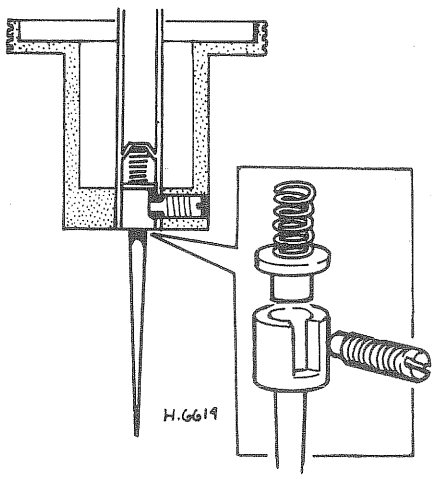


Fig. 3.10 The spring-loaded needle assembly fitted to the later SU HS4 carburettors (Sec 15)

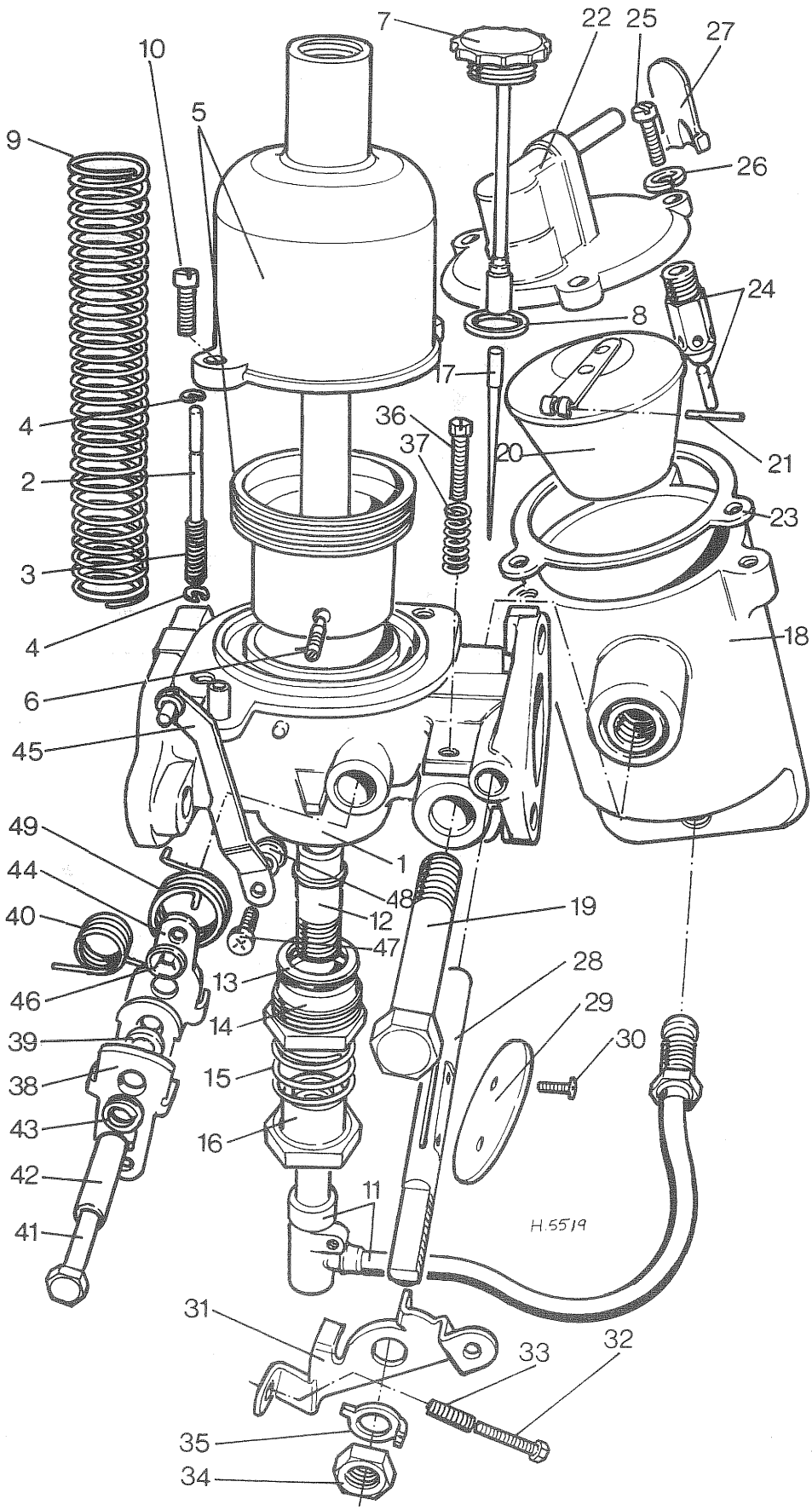


Fig. 3.11 Exploded view of the SU HS2 carburettor fitted to early manual transmission models (Sec 15)

1 *Body*
2 *Piston lifting pin*
3 *Spring*
4 *Circlip*
5 *Dashpot and piston assembly*
6 *Needle locking screw*
7 *Piston damper assembly*
8 *Washer for damper cap*
9 *Piston spring*
10 *Screw*
11 *Jet assembly*
12 *Jet bearing*
13 *Washer*
14 *Locknut for jet bearing*
15 *Lock spring*
16 *Jet adjusting nut*
17 *Jet needle*
18 *Float chamber body*
19 *Bolt*
20 *Float and lever assembly*
21 *Lever hinge pin*
22 *Float chamber lid assembly*
23 *Gasket*
24 *Needle and seat assembly*
25 *Screw*
26 *Spring washer*
27 *Baffle*
28 *Throttle spindle*
29 *Throttle disc*
30 *Screw*
31 *Throttle lever*
32 *Cam stop screw*
33 *Spring for stop screw*
34 *Throttle spindle nut*
35 *Tab washer*
36 *Idling stop screw*
37 *Spring for stop screw*
38 *Cam lever*
39 *Washer*
40 *Cam lever spring*
41 *Cam lever pivot bolt*
42 *Pivot bolt tube*
43 *Spring washer*
44 *Pick-up lever assembly*
45 *Jet link*
46 *Jet link retaining clip*
47 *Jet link securing screw*
48 *Bush*
49 *Spring for pick-up lever*

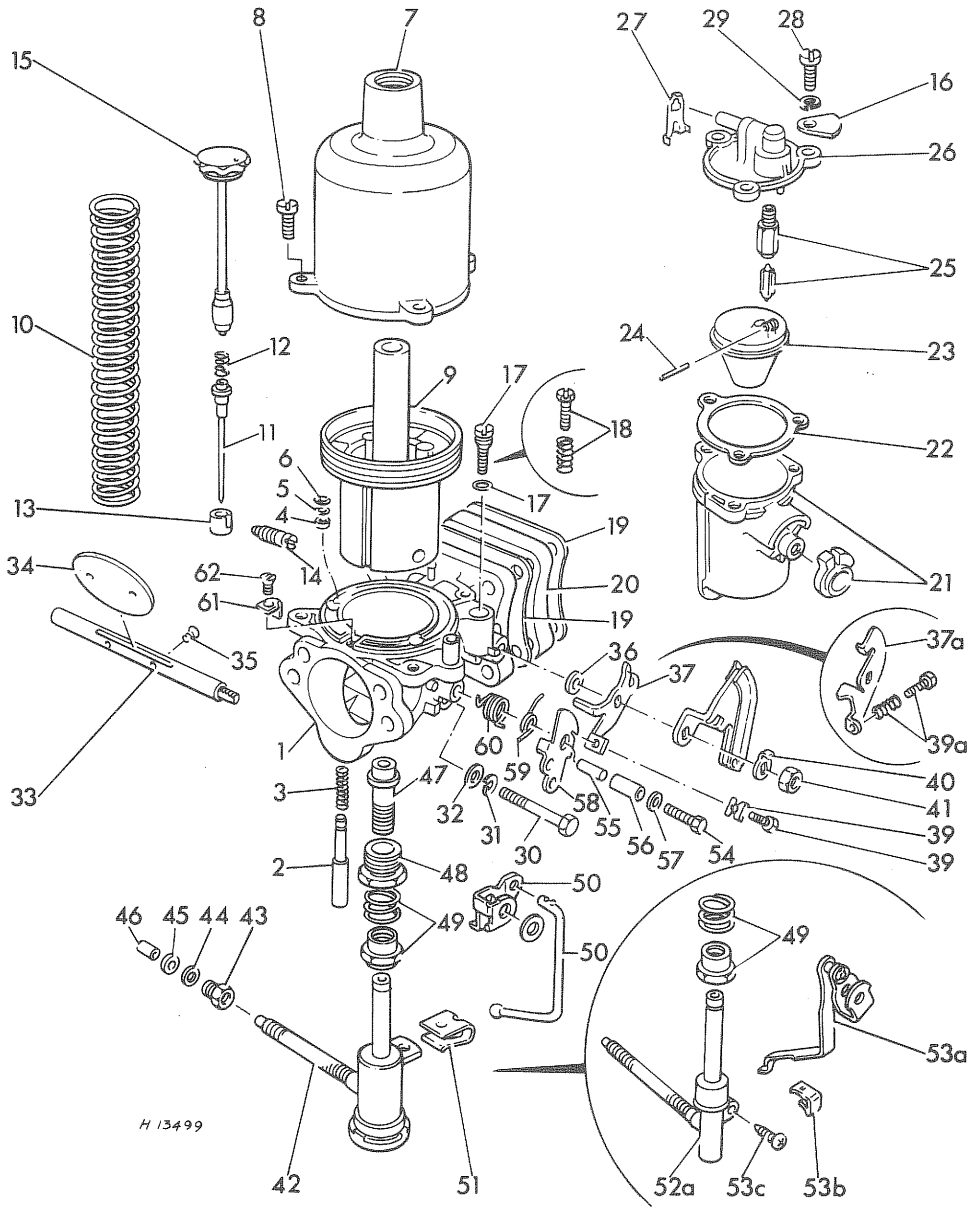


Fig. 3.12 Exploded view of the SU HS4 carburettor fitted to automatic transmission and later manual transmission models (Sec 15)

1 *Body*
2 *Piston lifting pin*
3 *Spring*
4 *Sealing washer*
5 *Plain washer*
6 *Circlip*
7 *Dashpot*
8 *Screw*
9 *Piston*
10 *Spring*
11 *Needle*
12 *Needle tension spring*
13 *Needle guide collar*
14 *Locking screw*
15 *Piston damper*
16 *Identification tag*
17 *Throttle adjusting screw and O-ring**
18 *Throttle adjusting screw and spring*
19 *Gaskets*
20 *Insulator block*
21 *Float chamber and spacer*
22 *Gasket*
23 *Float*
24 *Hinge pin*
25 *Needle and seat*
26 *Float chamber cover*
27 *Baffle plate*
28 *Screw*
29 *Spring washer*
30 *Bolt*
31 *Spring washer*
32 *Plain washer*
33 *Throttle spindle*
34 *Throttle disc*
35 *Screw*
36 *Washer*
37 *Throttle return lever**
37a *Throttle return lever*
38 *Progressive throttle (snail cam)*
39 *Fast idle screw**
39a *Fast idle screw and spring*
40 *Lockwasher*
41 *Nut*
42 *Jet assembly – Capstat type*
43 *Sleeve nut*
44 *Washer*
45 *Gland*
46 *Ferrule*
47 *Jet bearing*
48 *Jet locating nut*
49 *Jet adjustment nut and spring*
50 *Rod link and pick-up lever*
51 *Spring clip*
52a *Jet assembly* } non-Capstat type
53a *Pick-up lever* } non-Capstat type
53b *Link* } non-Capstat type
53c *Screw* } non-Capstat type
54 *Pivot bolt*
55 *Pivot bolt tube – inner*
56 *Pivot bolt tube – outer*
57 *Distance washer*
58 *Cam lever*
59 *Cam lever spring*
60 *Pick-up lever spring*
61 *Piston guide*
62 *Screw*
**Used with sealed adjustment carburettors*

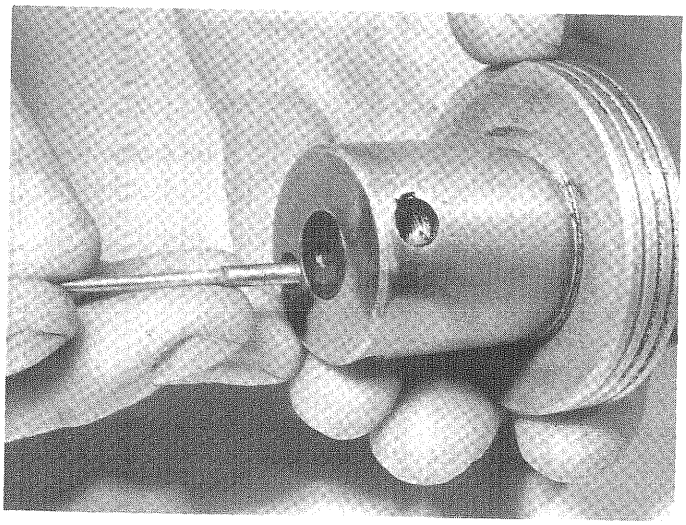
10 Undo and remove the small screw or release the clip that secures the jet link arm to the jet. Move the jet link arm to one side and withdraw the jet assembly, complete with fuel pipe from the jet housing.
11 It is not normally necessary to carry out any further dismantling of the SU carburettor. However, if the throttle spindle, jet housing, or float chamber are worn, damaged, or in any way suspect, the remainder of the carburettor may be dismantled as described below.
12 Bend back the small tab washer and then undo and remove the nut securing the throttle lever to the spindle. Lift off the lever.
13 Straighten the splayed ends of the two throttle disc retaining screws and then mark the position of the disc in relation to the spindle. Undo and remove the two screws, turn the disc to the fully open position and slide the disc out of the slot in the spindle. Note that new throttle disc retaining screws must be used when reassembling.
14 The spindle can now be removed from the carburettor body.
15 To remove the choke linkage undo the retaining pivot bolt and lift it off complete with linkage.
16 To dismantle the jet housing, first undo and remove the jet adjusting nut and lock spring. Next undo and remove the jet bearing locknut and withdraw the bearing.
17 The float chamber can be lifted off after unscrewing the retaining through-bolt. Recover the float chamber spacer, where fitted.
18 The carburettor is now completely dismantled with the exception of the piston lifting pin (omitted on later carburettors). The pin may be removed by prising off the small upper retaining circlip and lifting off the pin and spring.

16 SU carburettor – inspection and renovation

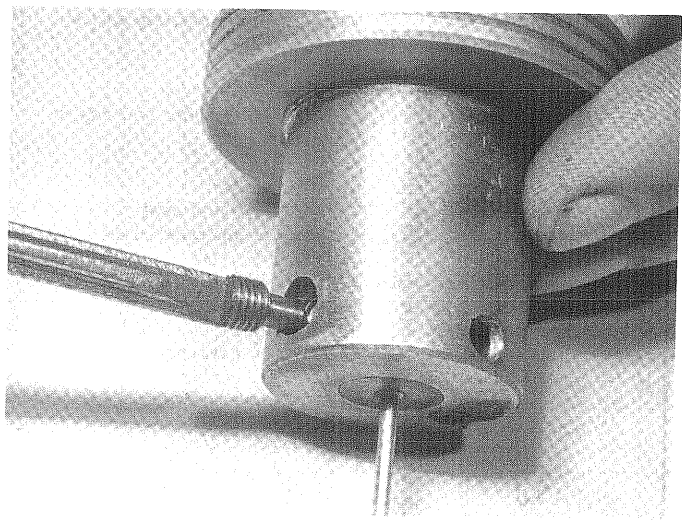
1 Thoroughly clean all the carburettor components in petrol or paraffin and dry with a lint-free cloth.
2 Carefully examine the throttle spindle and throttle disc for wear or distortion. If excessive wear is apparent on the spindle or spindle bushes in the carburettor body, air will enter the carburettor, altering the mixture strength and causing uneven running. The throttle spindle is obtainable separately, but if the bushes are worn, a complete carburettor body will normally have to be obtained.
3 Closely inspect the carburettor needle. If this has not been running centrally in the jet orifice then the needle will have a tiny ridge worn on it. If a ridge can be seen then the needle must be renewed. SU carburettor needles are made to very fine tolerances and should a ridge be apparent no attempt should be made to rub the ridge down with emery paper.
4 If the needle is worn, it is likely that the jet will also be worn. If this is the case, also renew the jet. Also inspect the outside of the jet head where it bears against the jet bearing. Wear can take place here due to the action of the choke control moving the jet up and down in the jet bearing.
5 The most critical components of the SU carburettor are the piston and dashpot assembly. Free movement of the piston in the dashpot is essential for the carburettor to function satisfactorily. The piston is machined to very fine tolerances so that it will not touch the side of the dashpot or carburettor body. If wear takes place on the centre guide tube or if deposits build up on the internal surfaces of the dashpot, the piston will come into contact with the side of the dashpot and will bind. This condition is known as piston sticking. If this condition cannot be improved after cleaning the inside of the dashpot and the piston with metal polish (harsh abrasives must not be used), then the piston and dashpot will have to be renewed. These two components are only obtainable as matched pairs and cannot be interchanged. The piston and dashpot assembly are in a satisfactory condition if the piston, having been pushed right to the top of the dashpot, will drop under its own weight without any trace of binding.
6 Examine the float chamber needle valve and seat next. After high mileage, it is quite likely that a ridge will have formed on the face of the needle. This could prevent the needle valve from shutting off the fuel supply and cause flooding of the carburettor. This is quite a common occurrence on SU carburettors and unless the needle and seat appear to be in perfect condition, they should both be renewed.
7 Finally, check the condition of the float. If any signs of cracking or distortion are evident, which may allow fuel to enter, renew the float.

17 SU carburettor – reassembly

1 If the carburettor has been completely dismantled, begin re-assembly by refitting the piston lifting pin and spring into the carburettor body and then refit the retaining circlip.
2 Place the float chamber in position and secure it in place, with the long retaining bolt inserted through the side of the carburettor body.
3 Refit the jet bearing, washer and locknut finger-tight only. Do not refit the lock spring or jet adjusting nut at this stage.
4 Refit the choke linkage and retaining pivot bolt.
5 Insert the throttle spindle into the carburettor body with the countersunk holes in the spindle facing outwards. Insert the throttle disc into the spindle, noting the assembly markings made during dismantling. Secure the disc to the spindle using new retaining screws, but do not tighten them. Snap the spindle open and shut to centralise the disc and make sure that the disc does not bind in the carburettor bore in any position. If necessary reposition the disc slightly. Now tighten the screws and spread their ends enough to prevent them from turning.
6 Slide the spacing washer and throttle lever onto the spindle, followed by the tab washer and retaining nut. Tighten the nut and bend over the tab washer.
7 On carburettors with a fixed jet needle, insert the needle into the piston, ensuring that the shoulder on the shank of the needle is flush with the underside of the piston. Refit and fully tighten the sunken retaining screw (photos).

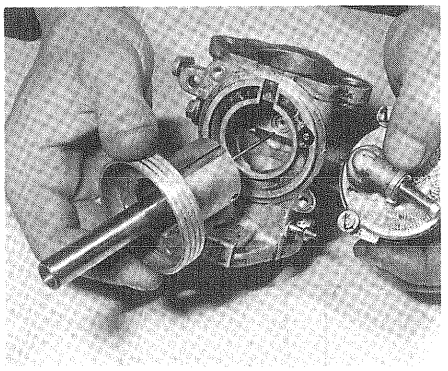


17.7a Refit the jet needle to the piston...

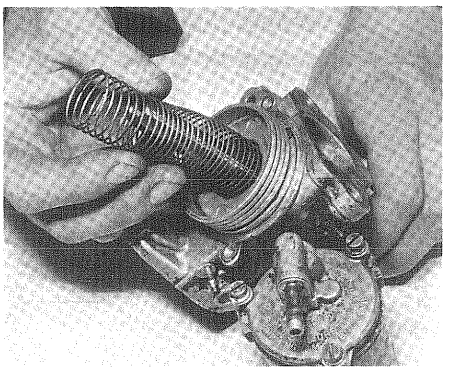


17.7b ...and secure with the retaining screw

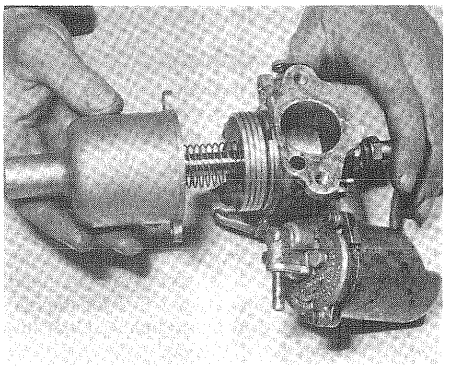
8 On carburettors equipped with a spring-loaded needle, fit the spring and guide collar to the needle and insert this assembly into the piston. Position the guide collar so that it is flush with the underside of the piston and position the needle so that the small etch mark is between the two piston transfer holes. Secure the assembly with the sunken retaining screw.
9 If the jet housing has been removed, it will now be necessary to centralise the jet as follows.
10 With the jet bearing, washer and locknut in position as described in paragraph 3, refit the jet adjusting nut, without the lock spring, and screw it up as far as it will go. Now slide the jet assembly into the jet housing.
11 Carefully refit the piston and needle assembly to the carburettor body, followed by the spring and dashpot (photos). Align the previously made marks on the dashpot and carburettor body and then refit the securing screws.
12 Slacken the jet bearing locknut and hold the piston down using a pencil inserted through the damper opening. Now tighten the jet bearing locknut.
13 Lift the piston and allow it to fall under its own weight. A definite metallic click should be heard, as the piston falls and contacts the bridge in the carburettor body.
14 Now fully lower the adjusting nut and note whether the piston still falls freely. If not, slacken the jet bearing locknut and repeat the centering procedure. It may be necessary to carry out the centering operation several times, until the piston will fall freely with the adjusting nut at the top and bottom of its travel.
15 With the jet correctly centralised, slide out the jet assembly and unscrew the adjusting nut. Now place the lock spring in position and refit the adjusting nut and jet assembly (photo). Secure the jet link arm to the jet with the screw or retaining clip (photo).
16 The flexible jet fuel supply tube can now be refitted to the base of the float chamber. Ensure that the small rubber sealing washer, nut and gland are in position on the tube and that there is at least 0.18 in (5.0 mm) of pipe protruding through the washer. Push the tube into the float chamber and tighten the union nut (photo).
17 Refit the fuel cut-off needle and seat to the float chamber cover. Place the float in position and tap in the float hinge pin until equal



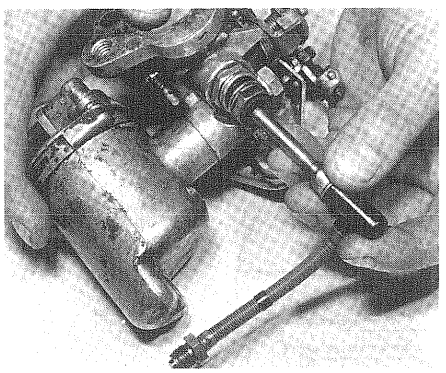
17.11a Refit the piston and needle assembly...



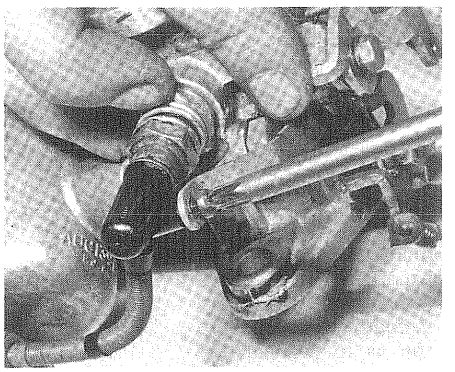
17.11b ...followed by the spring...



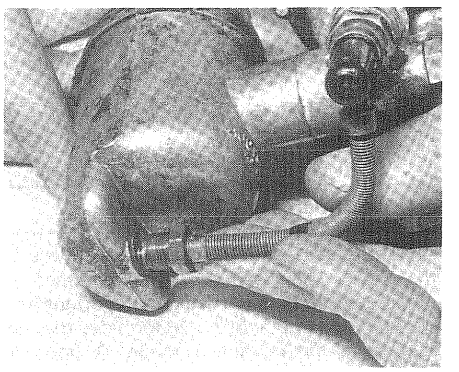
17.11c ...and dashpot



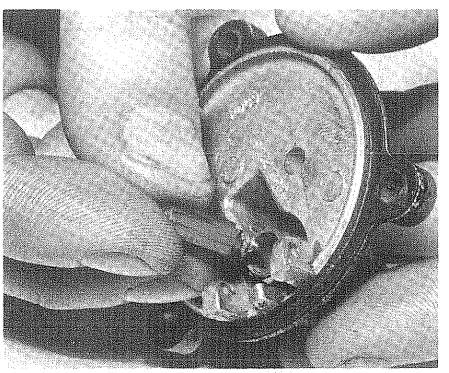
17.15a Refit the jet assembly...



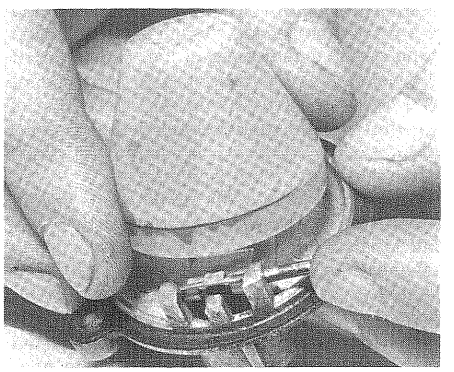
17.15b ...and connect the jet link arm



17.16 The other end of the feed tube is screwed into the float chamber



17.17a With the needle valve in place...



17.17b ...refit the float and hinge pin

amounts of the pin are protruding either side of the mounting lugs (photos).

18 Place a new gasket in position on the float chamber, refit the cover and secure it with the three retaining screws (photo).

19 Fill the carburettor piston damper with the correct grade of oil, until the level is 0.5 in (12.7 mm) above the top of the hollow piston rod. Now refit the damper plunger.

20 To obtain an initial jet setting and to allow the engine to be started, screw the jet adjusting nut up until the jet is flush with the bridge in the carburettor body. Now screw the nut down two complete turns on non-sealed carburettors and three complete turns on sealed units. **Note:** *The sealed type carburettors are identified by the throttle adjusting screw which is recessed within the carburettor body.*

21 The carburettor can now be refitted to the car as described in Section 14 and the slow running and mixture adjustments carried out as described in Section 19.

18 SU carburettor – float level adjustment

1 Refer to Section 2 and remove the air cleaner assembly.

2 Slacken the retaining clip screw and detach the fuel inlet pipe from the float chamber. Plug the pipe after removal.

3 Undo and remove the three securing screws and lift off the float chamber cover and gasket.

4 On early carburettors equipped with a brass float, invert the float chamber cover so that the needle valve is closed. It should now just be possible to place a $\frac{5}{16}$ in (8 mm) diameter bar parallel to the float hinge pin and in the centre of the float chamber cover, without fouling the float. If the bar lifts the float or if the float stands clear of the bar, bend the float lever very slightly until the clearance is correct.

5 Later carburettors fitted with plastic floats incorporate either a plain steel needle or a spring-loaded needle enclosed in a plastic sheath. The adjustment procedure for the plain steel needle type is the same as described in paragraph 4. Float level adjustment for spring-loaded needles is as follows.

6 Invert the float chamber cover so that the needle valve is closed but the spring is not compressed. The gap between the float and the flange on the float chamber cover, at the centre of the cover, should be between 0.125 in (3.18 mm) and 0.187 in (4.76 mm). If the gap is incorrect, bend the float lever slightly until the specified gap is obtained. In the case of floats having a moulded plastic hinge, increase or decrease the washer thickness under the needle seat to achieve the desired float level height.

7 When the float level is correct, refit the float chamber cover using the reverse sequence to removal.

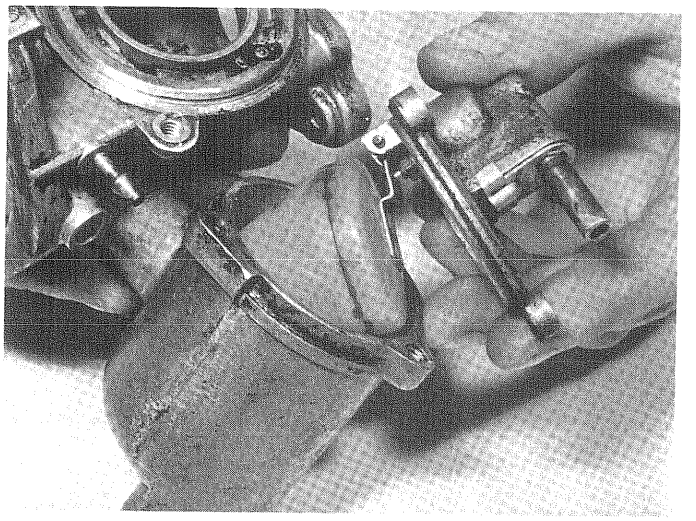
19 SU carburettor – adjustments

Three adjustments are possible on the SU carburettor. These are the engine idling speed, fast idling speed and mixture strength. The mixture strength is particularly important as the initial setting, carried out with the engine idling, determines the mixture strength throughout the entire engine speed range. A good indication as to whether carburettor adjustment is necessary can be gained by checking the colour of the exhaust tailpipe and listening to the note of the exhaust at idling speed. If the tailpipe is black and the engine appears to be hunting, it is quite likely that the mixture is too rich. If the exhaust is light grey or white in appearance, accompanied by a rhythmic puffing sound, this would indicate a weak mixture. Ideally, the exhaust should be a medium grey colour and emit a steady even drone. The colour of the spark plugs will also give a good indication as to the mixture strength and general engine condition (see Chapter 4). These checks should only be carried out after a good run of about 5 to 10 miles. Idling in city traffic and stop/start motoring is bound to cause excessively dark exhaust pipe and spark plug deposits.

Before carrying out any adjustments to the carburettor, ensure that the ignition system is in good condition, that the spark plugs, contact breaker points and ignition timing settings are correct, and that the engine is at normal operating temperature. Check also that the carburettor dashpot oil damper is topped up to the correct level with the specified grade of oil.

Depending on year of manufacture either a sealed or non-sealed carburettor may be fitted. Early models are equipped with the non-sealed type, identified by the throttle and fast idle adjusting screws which are clearly visible and retained by a tension spring or locknut. On the sealed carburettors the throttle adjusting screw is located in a recessed hole in the carburettor body and may be covered by a small circular metal cap.

Carburettor adjustment is carried out as follows, according to type.



17.18 Refitting the float chamber cover

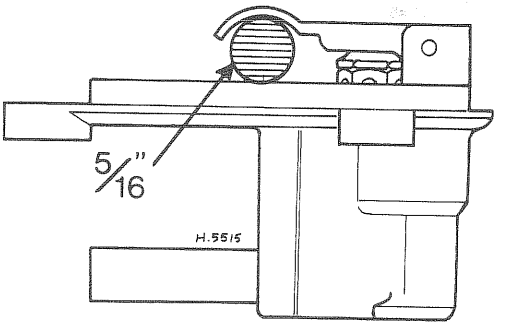


Fig. 3.13 Method of setting the correct clearance of the float lever – early carburettors (Sec 18)

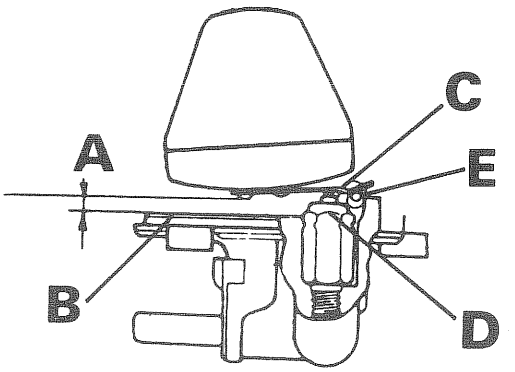


Fig. 3.14 Method of setting the correct clearance of the float lever – later carburettors (Sec 18)

A 0.125 to 0.187 in (3.18 to 4.76 mm)
B Machined lip
C Float lever adjustment point
D Float needle and seat assembly
E Lever hinge pin

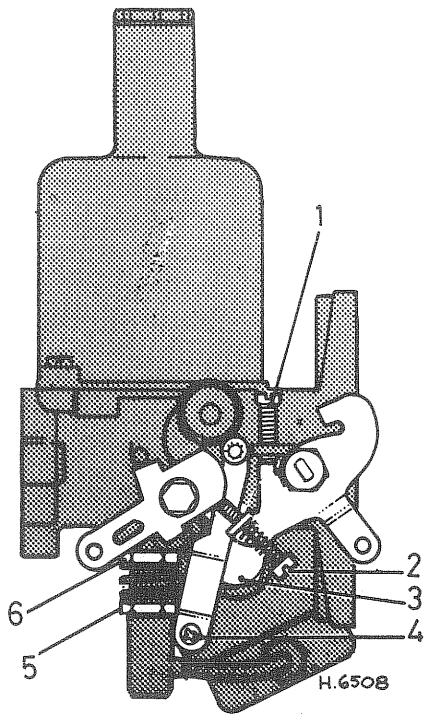


Fig. 3.15 Carburettor adjustment points – SU HS2 (Sec 19)

1 Throttle adjusting screw
2 Fast idle adjusting screw
3 Float chamber bolt
4 Jet link securing screw
5 Jet adjusting nut
6 Jet locknut

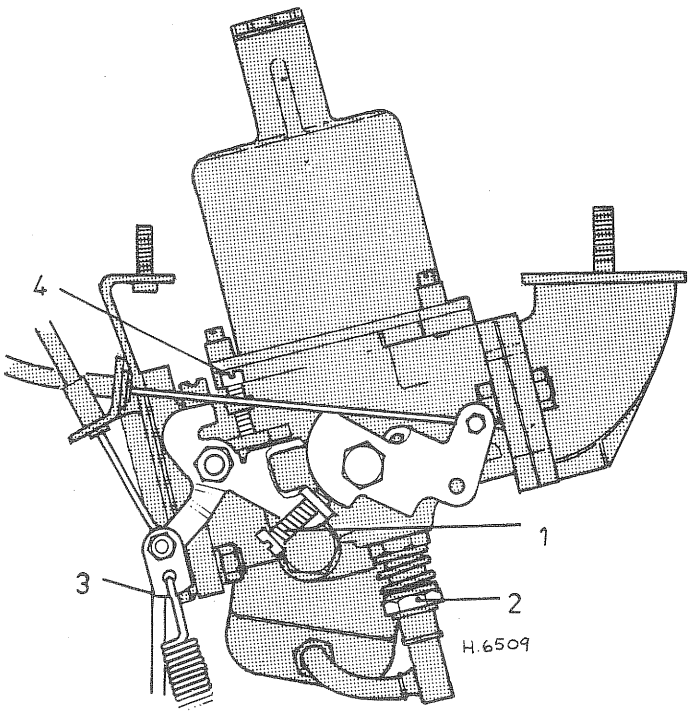


Fig. 3.16 Carburettor adjustment points – SU HS4 (Sec 19)

1 Fast idle adjusting screw
2 Jet adjusting nut
3 Governor control rod (automatic transmission)
4 Throttle adjusting screw

Single carburettor installations – non-sealed type

1 Remove the air cleaner as described in Section 2.
2 Set the engine idling speed by turning the throttle adjusting screw until the specified idling speed is obtained. **Note:** *If the throttle adjusting screw is secured by a locknut, slacken the locknut before turning the adjusting screw and leave it slackened until all the carburettor adjustments have been completed.*
3 To check the mixture strength, press the piston lifting pin on the side of the carburettor upwards, against light spring resistance, until it comes into contact with the piston. Now press it up a further $\frac{1}{32}$ in (1 mm) and listen to the engine speed. This will indicate one of the following:

(a) If the speed of the engine increases appreciably, the mixture is too rich
(b) If the engine speed immediately decreases or the engine stalls, the mixture is too weak
(c) If the engine speed remains constant or increases very slightly, the mixture is correct

4 To enrich the mixture, rotate the jet adjusting nut located at the base of the carburettor in an anti-clockwise direction viewed from below, ie downwards. To weaken the mixture, rotate the jet adjusting nut clockwise viewed from below, ie upwards, while at the same time pushing the jet assembly upwards against the nut. When altering the mixture strength, only turn the nut one flat at a time and check the mixture with the lifting pin each time.
5 It is quite likely that there will be a slight increase or decrease in engine rpm, after the mixture adjustment has been made. This should be corrected by turning the throttle adjusting screw, until the specified idling speed is again obtained.
6 With the engine idling at the specified speed and the mixture correctly adjusted, check the fast idle adjustment as follows.
7 Rotate the choke linkage on the side of the carburettor, to the point where the linkage just starts to lower the jet. Hold the linkage in this position and rotate the fast idle adjustment screw, until the specified engine fast idle speed is obtained.
8 When all adjustments are complete, refit the air cleaner and road test the car, carrying out any small adjustments that may be necessary, on the road.

Single carburettor installations – sealed type

9 Remove the air cleaner as described in Section 2.
10 If the tamperproof seals are still in position over the throttle adjusting screw and mixture adjusting nut, remove and discard them. The seal over the throttle adjusting screw can be hooked out of the recess using a small screwdriver. The seal on the jet adjusting nut can be removed by prising it open with a screwdriver and then lifting away the two halves.
11 Connect a tachometer to the engine (if one is not already fitted to the car), following the manufacturer's instructions. If your ears can attune to slight changes in engine rpm or to alterations of the exhaust note, then it is possible to carry out the adjustments without the use of a tachometer.
12 Set the engine idling speed, by turning the throttle adjusting screw until the specified idling speed is obtained.
13 Turn the jet adjusting nut located at the base of the carburettor in a clockwise or anti-clockwise direction, one flat at a time, until the fastest possible engine speed consistent with even running is obtained. Turning the nut clockwise viewed from below ie upward, weakens the mixture. Turning the nut anti-clockwise viewed from below, ie downward, enriches the mixture.
14 It is quite likely that there will be a slight increase or decrease in engine rpm after the mixture adjustment has been made. This should be corrected by turning the throttle adjusting screw until the specified idling speed is again obtained.
15 The remainder of the adjustment procedure is the same as described previously for non-sealed carburettors in paragraphs 6, 7 and 8.

Twin carburettor installations

16 Before adjusting the mixture strength on models fitted with twin carburettors, it is necessary to ensure that the volume of air passing through each carburettor is the same. This is done as follows.
17 Begin by removing the air cleaner assembly as described in Section 2.

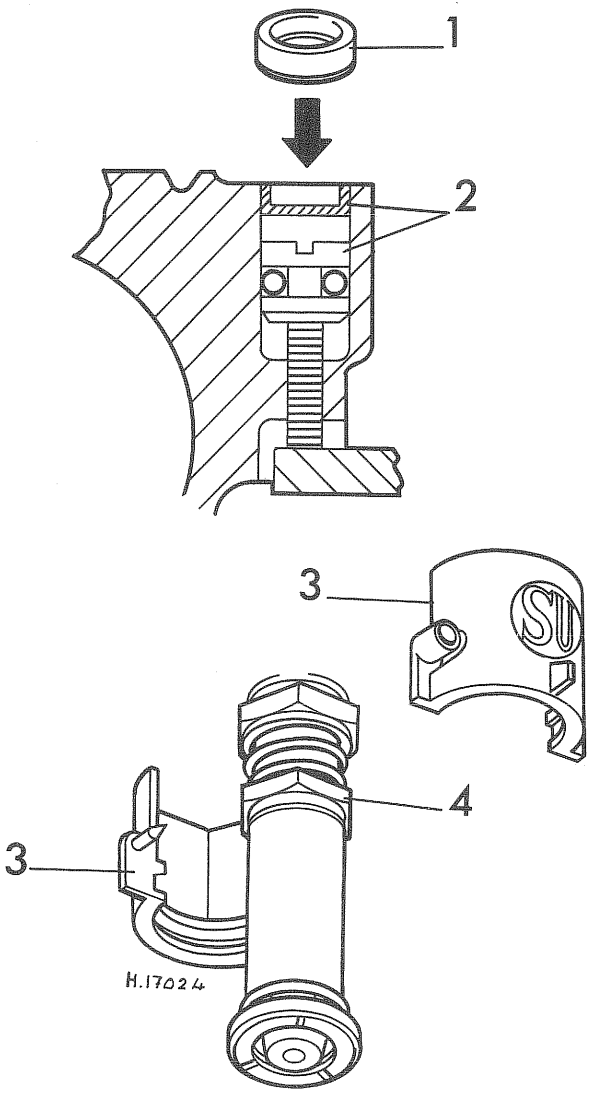


Fig. 3.17 The tamperproof caps fitted to the later type sealed carburettors (Sec 19)

1 Throttle adjusting screw cap
2 Throttle adjusting screw showing cap in position
3 Jet adjusting nut seals
4 Jet adjusting nut

18 Slacken the two clamp bolts on the throttle spindle operating arms and the two clamp bolts on the choke spindle operating arms.
19 Start the engine without depressing the accelerator and allow it to idle.
20 Using a proprietary balancing meter, in accordance with the manufacturer's instructions, balance the carburettor by altering the throttle adjusting screws until the airflow through both carburettors is the same.
21 Alternatively, use a length of small bore tubing, such as heater hose, approximately 18 in (457 mm) long, to compare the intensity of the intake hiss on both carburettors. Turn the throttle adjusting screws until the hiss sounds the same in both carburettors. It should be noted that this method is not really recommended, as it tends to be somewhat less accurate, and certainly more difficult, than using a balancing meter.
22 When the two carburettors are balanced, bring the engine idling speed back to the specified rpm by turning both throttle adjusting screws by equal amounts.

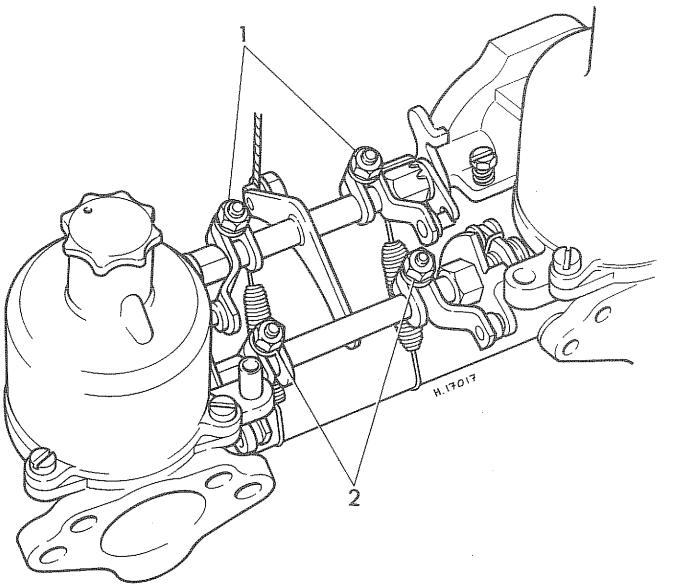


Fig. 3.18 Throttle and choke linkage – Cooper S models (Sec 19)

1 Throttle spindle operating arms
2 Choke spindle operating arms

23 Now tighten the two clamp bolts, on the throttle spindle operating arms, making sure that a slight clearance exists between the peg and the lower edge of the fork. Ensure also that the arms are positioned in such a way that both carburettor throttles open at the same time, when the accelerator pedal is depressed. If necessary, reposition one of the arms slightly to achieve this condition.
24 Now adjust the mixture strength for each carburettor using the procedure described in paragraphs 3 and 4.
25 If the idling speed requires adjustment after setting the mixture, turn both throttle adjusting screws by an equal amount in the desired direction.
26 The choke spindle operating arms can now be positioned and tightened using the method described previously for the throttle operating arms.
27 Finally, adjust the fast idle speed as follows.
28 Pull out the choke control knob or operate the linkage by hand, until the linkage just starts to lower the jet. Hold the linkage in this position and turn the fast idle adjusting screws, on both carburettors, until the specified fast idle speed is obtained and both carburettors are passing the same volume of air.
29 Adjustment of the carburettors is now complete. Refit the air cleaner and carry out a thorough road test.

20 Inlet manifold – removal and refitting

Note: *On vehicles fitted with emission control equipment it will be necessary to remove certain additional fittings, hoses and brackets to provide access to the inlet manifold. The items requiring removal will be obvious after a visual inspection, and full information regarding their removal will be found in the emission control Sections at the end of this Chapter.*

1 Refer to Section 14 and remove the carburettor(s) from the inlet manifold.
2 On models fitted with a brake servo, slacken the retaining clip screw and remove the vacuum hose from the union on the inlet manifold.
3 If working on Cooper S models, undo and remove the nuts, large flat washers and spring washers securing the manifold to the cylinder head. Lift off the manifold. On all other models proceed as follows.
4 Jack up the front of the car and support it on axle stands.
5 From underneath the car, undo and remove the nut and bolt securing the exhaust front pipe support strap to the gearbox bracket.

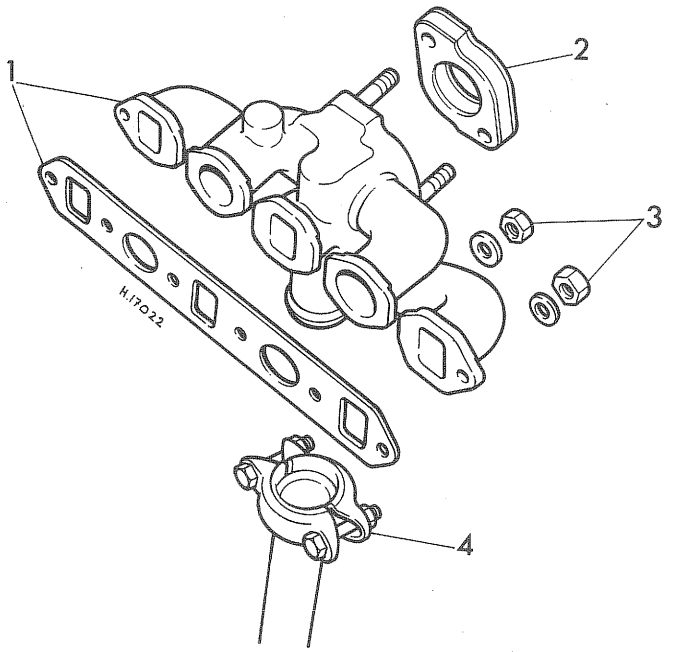


Fig. 3.19 Inlet and exhaust manifold assembly (Sec 20)

1 Manifold and gasket
2 Carburettor insulating block
3 Retaining nuts
4 Manifold-to-front pipe clamp

6 Undo and remove the two bolts and nuts securing the two halves of the exhaust manifold clamp to the front pipe. Lift away the clamp assembly.
7 Undo and remove the six nuts and flat washers securing the manifold to the cylinder head.
8 Lift off the hot air shroud, where fitted, and then slide the inlet and exhaust manifold assembly off the studs and withdraw it from the engine. Recover the manifold gasket.
9 Refitting is the reverse sequence to removal bearing in mind the following points:

(a) Ensure that the mating surfaces of the manifold and cylinder head are clean, and use a new gasket
(b) Refit the exhaust manifold-to-front pipe clamp before tightening the front pipe support strap bolt

21 Fuel tank – removal and refitting

Saloon models except Cooper S

1 Disconnect the battery earth lead and then remove the spare wheel from its location in the luggage compartment.
2 Remove the fuel gauge wires from their attachments to the sender unit located on the side of the tank (photo).
3 If the car is fitted with an electric fuel pump, slacken the clip and detach the fuel inlet hose from the pump inlet nozzle. Allow the fuel to drain into a suitable container. If a mechanical fuel pump is fitted it will be necessary to empty the tank by pumping or siphoning out all the fuel. **Note:** *A number of earlier models were fitted with a fuel tank incorporating a combined drain plug and tube. Access to this is from below the car, using a long box spanner.* In all cases carry out the draining or siphoning operation in a well ventilated area, never in a garage or over an inspection pit.
4 When the tank is empty, slacken the clip and detach the fuel hose from the front of the tank.
5 Detach the fuel tank breather pipe and remove the filler cap.
6 Undo and remove the tank securing strap bolt and carefully manoeuvre the fuel tank from the luggage compartment (photo).
7 Refitting is the reverse sequence to removal.

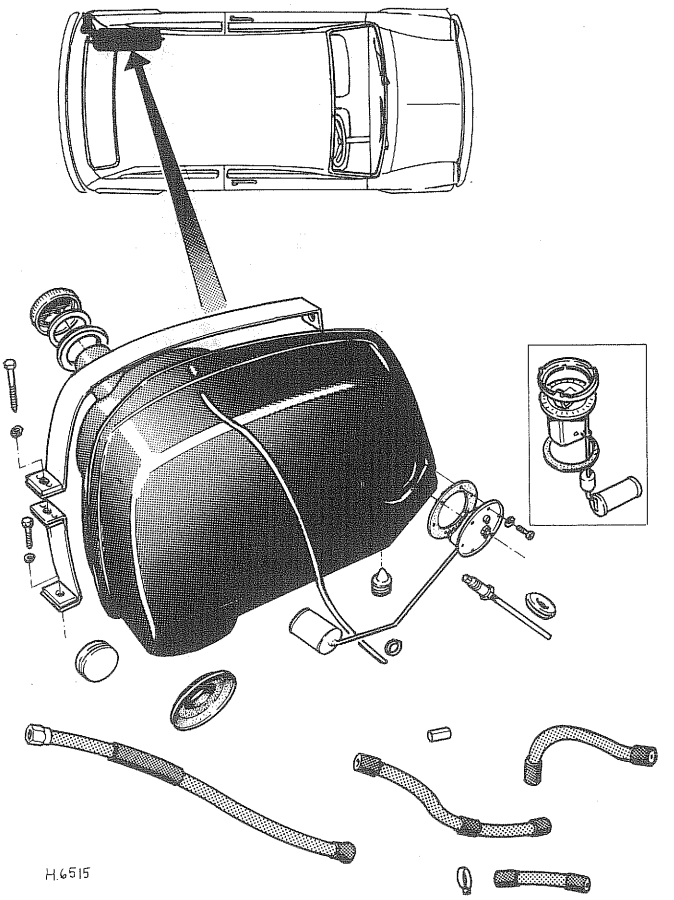
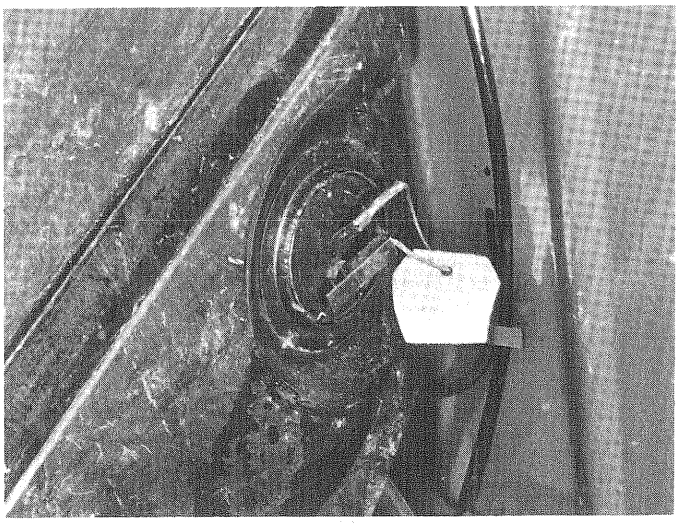


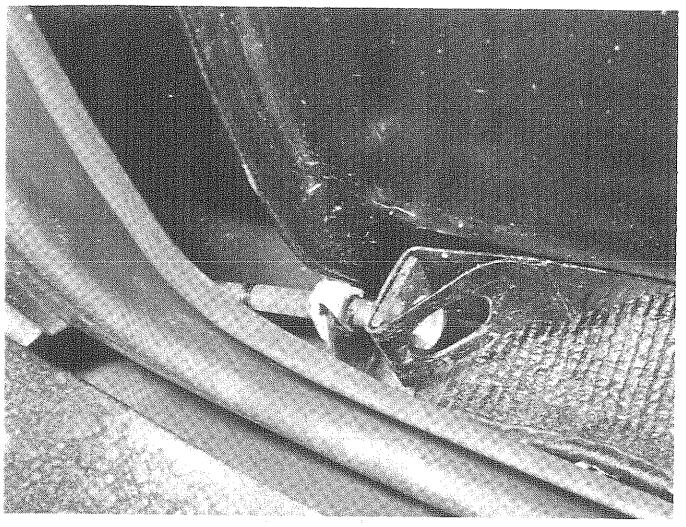
Fig. 3.20 Fuel tank and fittings – Saloon models (Sec 21)



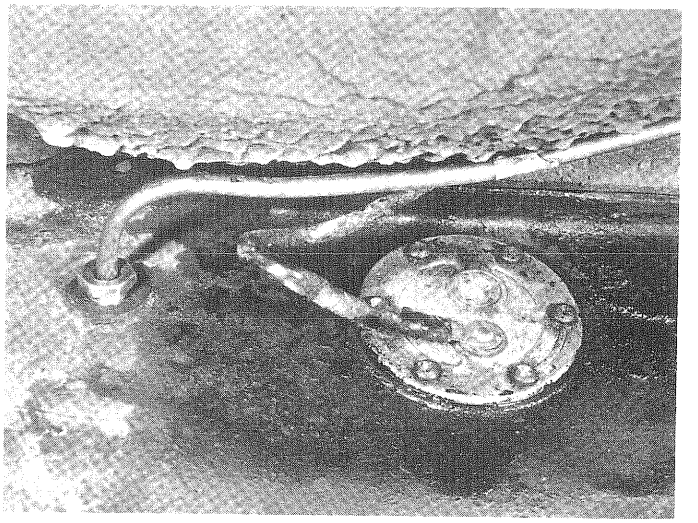
21.2 Electrical leads at the fuel gauge sender unit on the side of the tank (Saloon models)

Estate, Van and Pick-up models

8 Jack up the rear of the car and support it on axle stands. Disconnect the battery earth terminal.
9 Remove the filler cap and from underneath the car, undo and remove the drain plug, allowing the fuel to drain into a suitable container. Do this in a well ventilated area, not in a garage or over an inspection pit. When drained, refit the drain plug and washer securely.
10 While still underneath the car, disconnect the fuel outlet pipe and the fuel gauge wires from their connections on the sender unit on the side of the tank (photo).



21.6 Fuel tank securing strap and bolt (Saloon models)



21.10 Fuel tank outlet pipe and fuel gauge sender unit (Estate, Van and Pick-up models)

11 Undo and remove the six screws which hold the tank in place and remove the tank. It is helpful if a jack is positioned under the tank as the retaining screws are removed so that the tank does not drop out under its own weight. It may also be found easier to lower the tank slightly on the jack before disconnecting the sender unit leads, as with the tank half removed they are more accessible.
12 Refitting the tank is the reverse sequence to removal bearing in mind the following points:

(a) Make sure that the nylon spacers located at each retaining screw hole are in position before refitting the tank
(b) Ensure that the drain plug and washer are in place and securely tightened
(c) Ensure that the rubber ferrule beneath the filler cap makes an effective seal with the body

Cooper S twin fuel tanks

13 Working in the rear luggage compartment remove the trimmed floor panel.
14 For safety reasons, disconnect the battery earth cable.
15 Lift out the spare wheel.
16 Remove the fuel filler caps.
17 Unscrew the left-hand fuel tank drain plug three turns and allow fuel to drain from both tanks.

Left-hand tank

18 Disconnect the electrical connectors from the sender unit.
19 Remove the tank strap securing bolt.
20 Detach the flexible pipe and the vent pipe from the fuel tank.
21 Carefully ease the fuel tank towards the centre of the luggage compartment and lift away from the rear of the car.

Right-hand tank

22 Completely remove the battery.
23 Remove the tank strap securing bolt.
24 Detach the flexible hose from the left-hand tank.
25 Move the tank slightly from its mountings, taking extreme care not to damage the flexible fuel pipes.
26 The fuel tank will still contain a small amount of petrol which should be drained into a small container when the flexible fuel pipe is disconnected.
27 Disconnect the flexible fuel pipe.
28 Finally detach the vent pipe from the tank and lift away the tank from the rear of the car.

Both tanks

29 Refitting the fuel tank is the reverse sequence to removal. Make sure that the seal around the drain plug housing is water-tight.

22 Fuel tank – cleaning

With time it is likely that sediment will collect in the bottom of the fuel tank. Condensation, resulting in rust and other impurities, will usually be found in the fuel tank of any car more than three or four years old.

When the tank is removed it should be vigorously flushed out and turned upside down, and if facilities are available, steam cleaned.

23 Fuel tank sender unit – removal and refitting

Saloon models

1 Disconnect the earth lead from the battery and remove the fuel gauge wires from their attachments to the sender unit mounted in the side of the tank.
2 *Early models:* Unscrew the screws which hold the gauge unit to the tank carefully, and lift the complete unit away, ensuring that the float lever is not bent or damaged in the process.
3 *Later models:* Using crossed screwdrivers remove the fuel gauge sender unit by turning the locking ring through 30° and lifting away. Carefully lift the unit from the tank, ensuring the float lever is not bent or damaged in the process.
4 Refitting the unit is a reversal of the above process. To ensure a fuel-tight joint, scrape both the tank and sender gauge mating flanges clean, and always use a new joint gasket and a suitable gasket cement.

Estate, Van and Pick-up models

5 Refer to Section 21 and remove the fuel tank from the car.
6 Removal and refitting of the sender unit now follows the procedure described for Saloon models.

24 Accelerator cable – removal and refitting

1 Working in the engine compartment, disconnect the throttle return spring(s) and undo the nut and washer securing the cable to the bolt on the throttle lever.
2 Pull the cable through the bolt and slide it out of the steady bracket on the rocker cover (if fitted).
3 From inside the car, depress the accelerator pedal and withdraw the ferrule on the cable from the slot in the top of the pedal arm.
4 The cable can now be withdrawn through the opening in the bulkhead and into the engine compartment.
5 To refit the cable, feed it through the bulkhead and engage the ferrule into the slot on the pedal arm.
6 Now feed the other end of the cable through the brackets on the

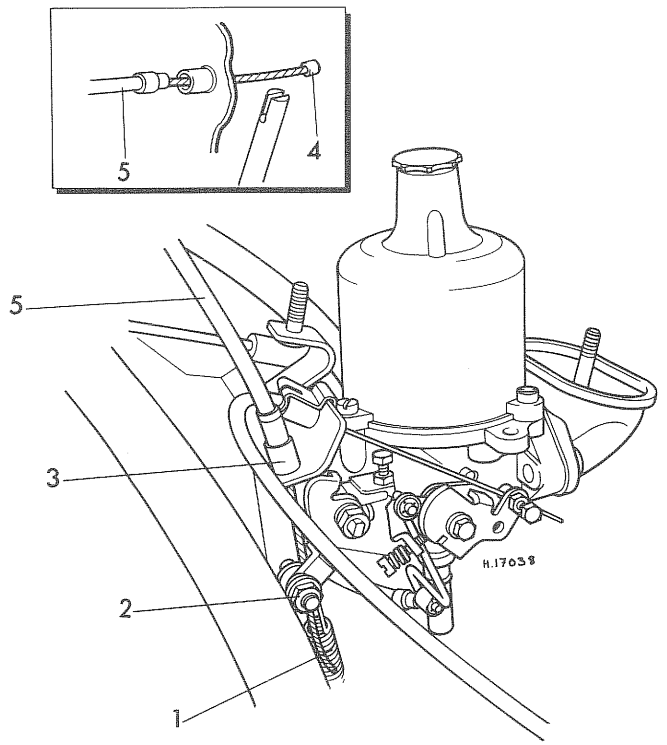


Fig. 3.21 Accelerator cable attachments (Sec 24)

1 Throttle return spring
2 Cable-to-throttle lever securing bolt
3 Cable support bracket
4 Cable ferrule – pedal end
5 Outer cable

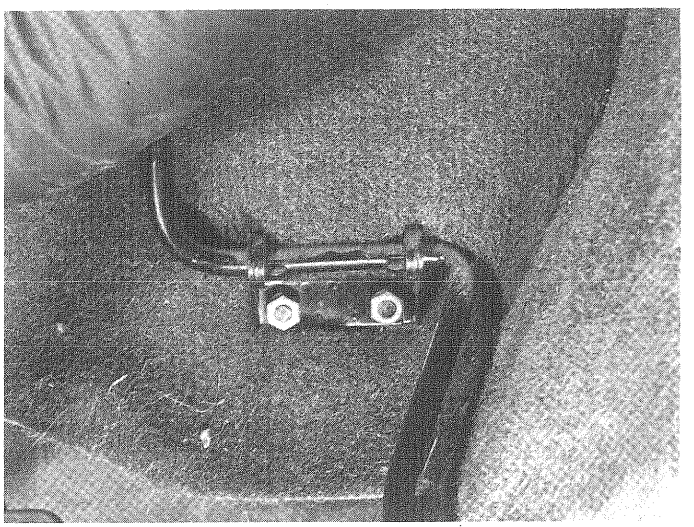
rocker cover and carburettor, and then insert the inner cable into the slotted bolt on the throttle lever.
7 Pull the cable through the bolt to take up any slack and then refit the washer and nut.
8 Reconnect the return spring and check that a slight amount of free play exists between the pedal and cable.
9 Start the engine and check the operation of the cable.

25 Accelerator pedal – removal and refitting

1 Depress the accelerator pedal and detach the accelerator cable ferrule from the slot at the top of the pedal arm.
2 Undo and remove the two bolts securing the pedal assembly to the bulkhead and lift out the pedal (photo).
3 Refitting is the reverse sequence to removal.

26 Choke cable – removal and refitting

Note: *On models fitted with a centre console it will be necessary to remove the centre console and console glovebox retaining screws. This will allow the console to be moved slightly to provide access for the following operations.*
1 Disconnect the battery earth terminal.
2 Refer to Section 2 and remove the air cleaner assembly.
3 Working in the engine compartment, disconnect the choke inner cable from the trunnion screw on the choke linkage and the outer cable from the support bracket. Withdraw the complete cable from the carburettor.
4 From inside the car, undo and remove the two screws securing the heater assembly to the front of the parcel shelf. Now lower the heater slightly at the front.
5 Disconnect the heater switch wires from the switch.
6 Undo and remove the two nuts or screws which secure the auxiliary switch panel to the centre of the parcel shelf.



25.2 Accelerator pedal retaining nuts

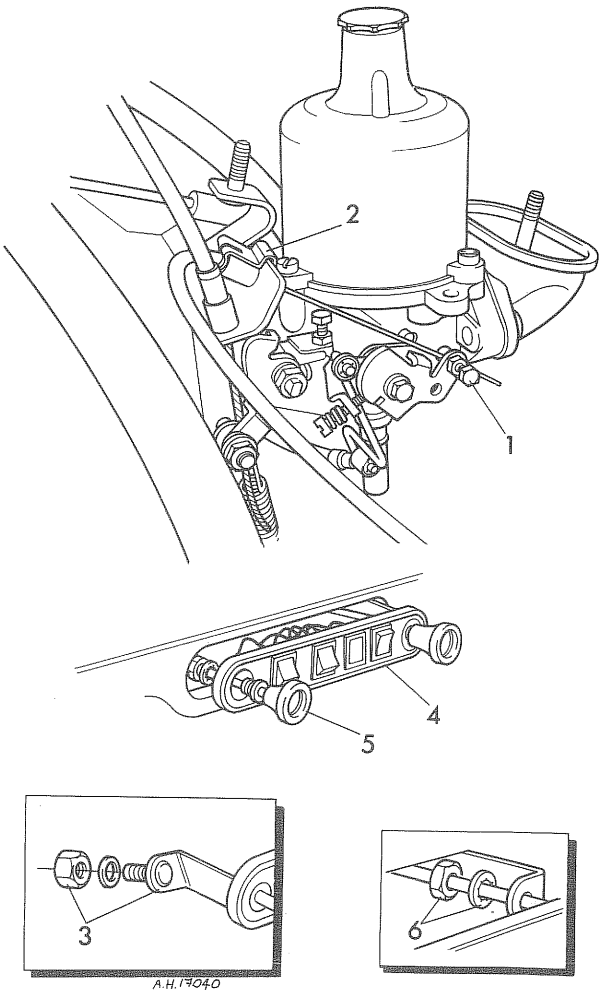


Fig. 3.22 Choke cable attachments (Sec 26)

1 Inner cable-to-linkage attachment
2 Outer cable support bracket
3 Switch panel retaining nuts
4 Switch panel
5 Choke cable
6 Cable retaining nut and washer

7 Draw the switch panel forward and unscrew the choke cable retaining nut from the rear of the panel.
8 Pull the complete cable through the bulkhead grommet and switch panel, into the passenger compartment. Recover the retaining nut and lockwasher from the end of the cable.
9 To refit the cable, slide it through the slot in the switch panel and then place the nut and washer over the cable.
10 Insert the cable through the bulkhead grommet and through to the engine compartment.
11 Screw on and fully tighten the choke cable retaining nut and then refit the switch panel, reconnect the heater switch leads and refit the heater securing screws.
12 Engage the other end of the cable into the support bracket and the inner cable into the trunnion on the choke linkage.
13 Ensure that the choke cable is pushed fully in, ie in the 'off' position, and then tighten the retaining screws on the support bracket and cable trunnion. Ensure that there is $\frac{1}{16}$ in (1.5 mm) of free play on the cable before the cable starts to operate the choke linkage.
14 Finally refit the air cleaner, reconnect the battery earth terminal and, where applicable, refit the centre console retaining screws.

27 Exhaust system – general description

The exhaust system fitted to all Mini models covered by this manual, except Cooper S, consists of a cast iron manifold and a one-piece tubular steel exhaust pipe. A single silencer is fitted to the rear section of early models; later versions incorporate an additional intermediate silencer. The system fitted to Cooper S models comprises a three branch manifold, a front pipe and separate tailpipe incorporating a silencer. Certain versions have a second silencer located beneath the floor pan.

On all models the exhaust system is flexibly attached to the car by two rubber mountings on the rear subframe and a bracket at the base of the transmission.

At regular intervals, the system should be checked for corrosion, joint leakage, the condition and security of the rubber mountings, and the tightness of the joints.

28 Exhaust system – removal and refitting

All models except Cooper S

1 Working in the engine compartment, remove the air cleaner and detach the throttle return spring from the bracket on the exhaust manifold clamp.
2 Undo and remove the nuts and bolts and withdraw the manifold clamp (photo).
3 Jack up the car and support it with axle stands to obtain the maximum amount of working room underneath.
4 From underneath the car, undo and remove the nut and bolt securing the exhaust front pipe to the gearbox or gearbox bracket.
5 Now undo and remove the nuts and spring washers securing the exhaust intermediate and rear mounting brackets to the rubber blocks

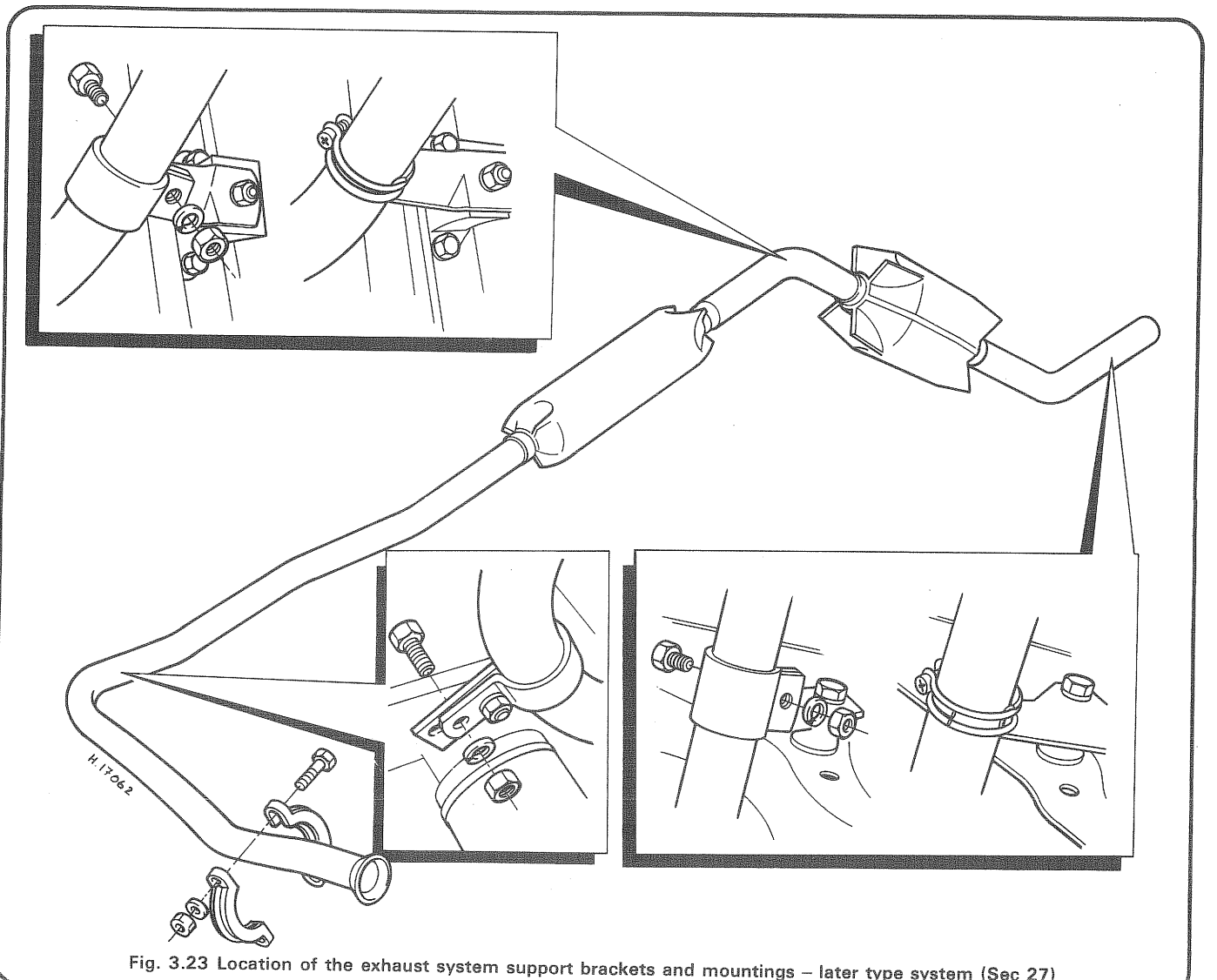
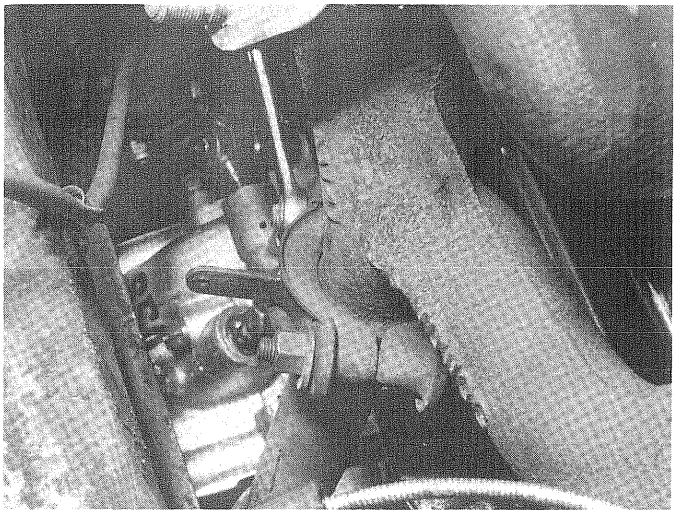
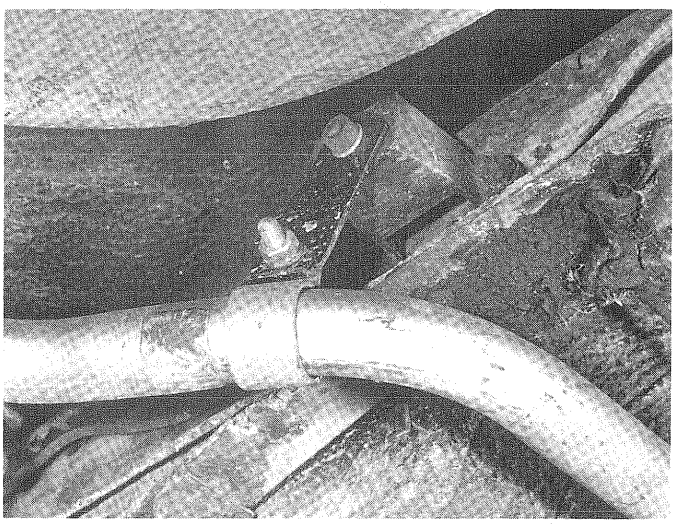


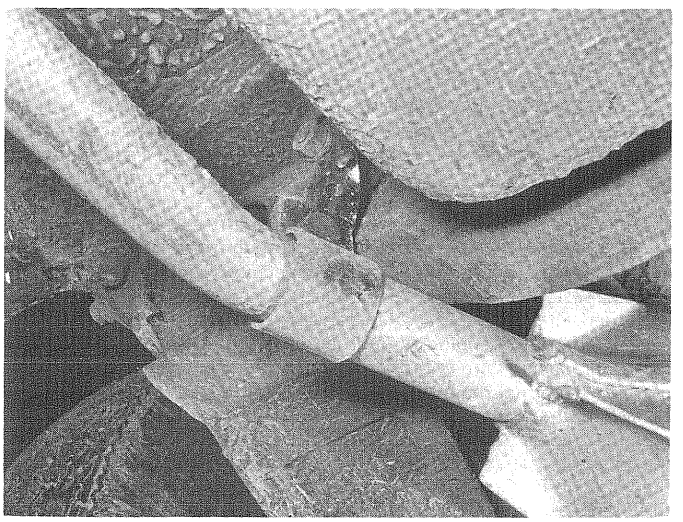
Fig. 3.23 Location of the exhaust system support brackets and mountings – later type system (Sec 27)



28.2 Exhaust front pipe-to-manifold clamp



28.5a Exhaust pipe intermediate...



28.5b ...and rear mountings on subframe

on the rear subframe (photos). Slide the brackets off the studs on the rubber blocks and lower the complete system to the ground.

6 Carefully inspect the rubber mounting blocks, the exhaust system brackets and clamps for signs of deterioration, corrosion or damage and renew as necessary.

7 To refit the exhaust system, place it in position under the car and locate the brackets onto the rubber mounting blocks at the rear. Refit the nuts and spring washers but do not tighten at this stage.

8 With the help of an assistant or with the use of a jack, position the bellmouth on the front pipe squarely in position over the flange on the manifold. Hold the system in this position and refit the manifold clamp. Ensure that the pipe is square and that the clamp is seated properly over the pipe and manifold flanges otherwise leaks will occur at this joint.

9 Now fully tighten the manifold clamp securing bolts and refit the throttle return spring.

10 Check that the exhaust system is clear of the subframe and floor pan over its entire length and that it is not in tension. Now fully tighten the rear mountings.

11 Lower the car to the ground, refit the air cleaner, start the engine and check for leaks.

Cooper S models

12 Jack up the front and rear of the car, and support it on stands to obtain the maximum amount of working room underneath.

13 If the rear silencer and tailpipe only are to be removed, slacken the exhaust clamp securing the rear silencer to the front pipe and then remove the retaining clip securing the tailpipe to the rear mounting. Twist the rear silencer back and forth to separate the joint and then withdraw the tailpipe from under the car. Apply liberal amounts of releasing oil to the tailpipe-to-front pipe joint if it is reluctant to come free, and allow it time to soak in.

14 To remove the complete system, slacken the front pipe to exhaust manifold clamp, and undo and remove the bolts securing the rear mountings to the subframe. Twist the complete system back and forth to free the joint and lower it to the ground.

15 In all cases, refitting is the reverse sequence to removal.

29 Exhaust manifold – removal and refitting

All models except Cooper S

1 The exhaust manifold fitted to all engines except the 1275cc Cooper S units is removed as an assembly with the inlet manifold. Full details on this procedure will be found in Section 20.

Cooper S models

2 Begin by removing the inlet manifold as described in Section 20.

3 Remove the complete exhaust system as described in Section 28.

4 Undo and remove the nuts and flat washers securing the manifold to the cylinder head studs. Now ease the manifold off the studs and carefully manipulate it out of the engine compartment.

5 Refitting is the reverse sequence to removal, but use a new manifold gasket.

30 Emission control systems – general description

Certain models of the Mini, in particular those exported to the USA and Canada, are fitted with exhaust, crankcase, and fuel evaporative loss emission control systems. A brief description of the operation of the systems is given below. Note that testing, repair and overhaul of the emission control equipment requires specialist tools and knowledge, and no attempt should be made to dismantle any of the components. Should the system develop a fault it is recommended that you seek the advice of a BL dealer. The content of the following Sections is therefore limited to removal and refitting instructions for access to other engine components, and minor servicing and adjustments which can be carried out by the private owner.

Exhaust emission control system

The basis of this system is an air pump which supplies air under pressure to the cylinder head exhaust port of each cylinder, via an air injection manifold. A check valve is incorporated in the air delivery pipe to prevent a blow-back of exhaust gases from reaching the pump. Air from the pump is also supplied to the inlet manifold via a gulp valve

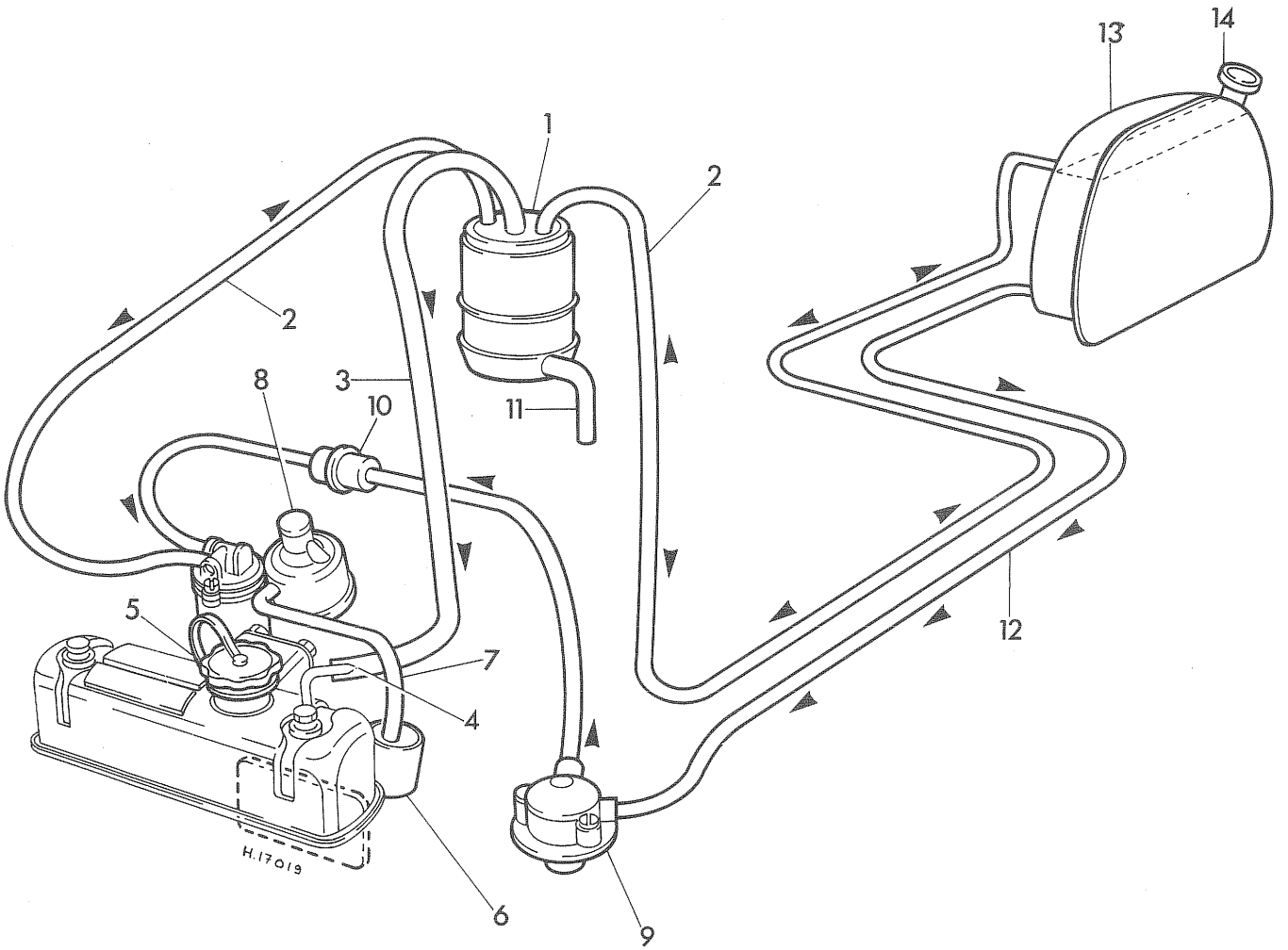


Fig. 3.24 General layout of the emission control systems (Sec 30)

1 *Charcoal canister*
2 *Vapour pipes*
3 *Purge hose*
4 *Breather restrictor*
5 *Oil filler cap*
6 *Flame trap*
7 *Crankcase purge hose*
8 *Carburettor*
9 *Fuel pump*
10 *Fuel filter*
11 *Vent hose*
12 *Fuel pipe*
13 *Fuel tank*
14 *Fuel filler cap*

to weaken the rich fuel/air mixture in the manifold during engine deceleration and overrun.

The air pump is of the rotary vane type and is mounted at the front of the cylinder head. Drive to the pump is by a V-belt from the water pump pulley. Air enters the pump through an extraction filter on early models, or through radial air intakes around the pulley on later versions. At high engine speeds, excess air is discharged to atmosphere through a relief valve.

A diverter valve is incorporated in the air delivery pipe between the air pump and check valve. The valve is operated by a cable on early models, or activated by a vacuum switch on later types, whenever the choke control is pulled out. During choke operation, air from the pump is cut off and diverted to atmosphere.

When the throttle is closed during deceleration or overrun, a rich fuel/air mixture is created in the inlet manifold. The gulp valve fitted between the air pump and manifold is activated by the depression also created in the manifold during these conditions, and opens to admit air from the air pump. The mixture is thus weakened preventing excessive exhaust emissions when the throttle is reopened. A restrictor is also fitted in the air feed to the gulp valve and prevents surging when the valve is in operation.

An SU HS4 carburettor is used on all engines equipped with an exhaust emission control system. The carburettor is manufactured to a special emission control specification and incorporates a spring-loaded jet metering needle to give a fine degree of mixture control.

Crankcase emission and fuel evaporative loss systems

Piston blow-by fumes are emitted through a flame trap breather outlet on the left-hand cylinder block side cover, which is connected to the depression chamber of the carburettor by a short hose. Additionally purged air from the charcoal canister of the fuel evaporative loss system enters the engine through an inlet on the valve rocker cover. These fumes combine with the incoming fuel/air mixture for combustion in the normal manner.

When the engine is stopped, vapours from the fuel tank vent, and on later models from the carburettor float chamber vent, are stored in the charcoal canister. When the engine is running the vapours are drawn into the engine via the rocker cover inlet, to be disposed of by the crankcase emission system. The design of the fuel tank ensures that only fuel vapour is allowed to reach the charcoal canister, and also that sufficient fuel tank volume remains after filling to allow for expansion of the fuel as a result of temperature rise.

31 Air pump drivebelt – removal and refitting

1 Release the three retaining lugs and remove the engine ignition shield, if fitted.
2 Undo and remove the two bolts securing the radiator upper mounting bracket to the radiator.
3 Unscrew the radiator filler cap and slacken the top hose securing clips. Carefully ease the radiator as far as possible toward the wing valance. Place a container beneath the engine to catch the small quantity of coolant that will be lost as the top hose is released.
4 Slacken the air pump pivot and adjusting link bolts, push the pump in toward the engine, and slip the drivebelt off the two pulleys.
5 Feed the belt between the fan blades and the radiator cowling at the top as the blades are rotated. Now pull the belt out from between the fan and radiator.
6 Refitting the drivebelt is the reverse sequence to removal. Adjust the tension of the drivebelt so that there is 0.5 in (12 mm) deflection of the belt, using thumb pressure, at a point midway between the two pulleys. Recheck to coolant level on completion.

32 Air pump – removal and refitting

1 Remove the drivebelt as described in the previous Section.
2 Slacken the clips and detach the outlet hoses from the pump adaptor.
3 Detach the HT lead and undo and remove No 1 cylinder spark plug.
4 Slacken the bolt securing the pump adjusting arm to the alternator pivot bolt.
5 Undo and remove the bolt securing the adjusting arm to the air pump.
6 Undo and remove the air pump pivot nut and bolt and lift off the pump.
7 Refitting is the reverse sequence to removal. Ensure that the drivebelt is correctly tensioned as described in the previous Section.

33 Air manifold – removal and refitting

1 Release the three retaining lugs and remove the engine ignition shield, if fitted.
2 Detach the HT lead from No 1 cylinder spark plug.
3 Undo and remove the four air manifold unions from the cylinder head.
4 Slacken the clip securing the check valve hose and lift away the air manifold complete with check valve.
5 Hold the air manifold union with a spanner and unscrew the check valve.
6 Refitting is the reverse sequence to removal.

34 Check valve – removal, testing and refitting

1 Slacken the retaining clip and detach the hose from the check valve.
2 Hold the air manifold union to prevent it twisting and unscrew the check valve.
3 To test the valve gently blow into each end in turn. Air should pass through the valve from the air supply end only. If air will pass in both directions the valve is faulty and must be renewed. Do not use high pressure air or air from a tyre pump for this check or the valve will be damaged.
4 Refitting the check valve is the reverse sequence to removal.

35 Diverter valve – removal, testing and refitting

Vacuum operated type

1 To test the operation of the valve, slacken the hose clip and detach the diverter valve-to-check valve hose at the check valve end.
2 Start the engine and allow it to idle. Air pressure should be felt at the end of the disconnected hose.

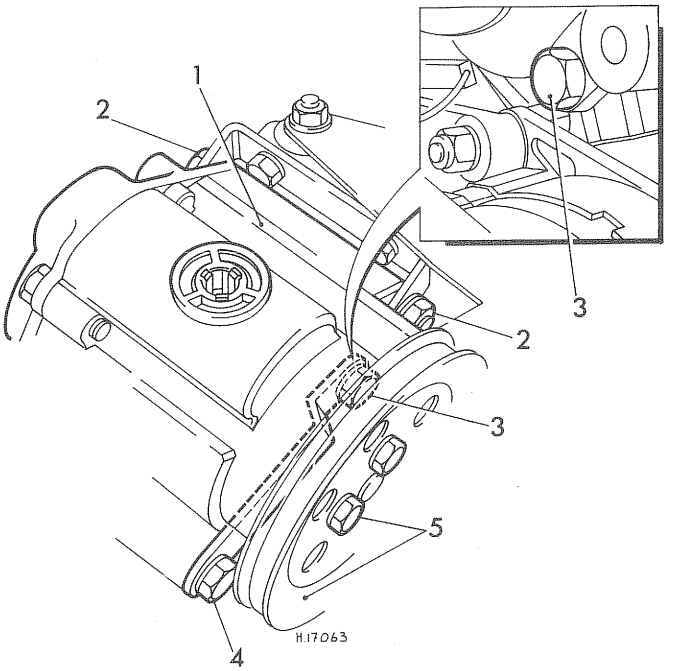


Fig. 3.25 Air pump drivebelt removal (Sec 31)

1 Air pump
2 Pump mounting pivot bolt and nut
3 Adjusting link inner retaining bolt
4 Adjusting link outer retaining bolt
5 Pulley and retaining bolts

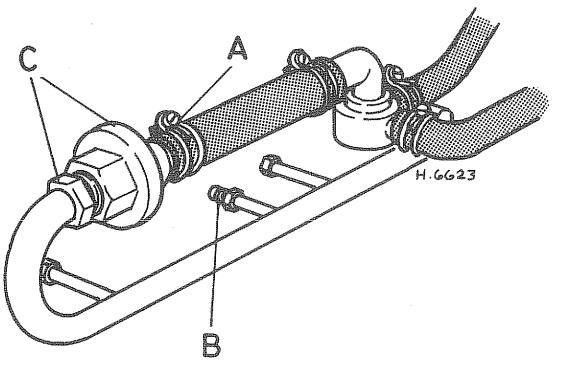


Fig. 3.26 Air manifold assembly (Sec 33)

A Check valve hose clip
B Air manifold unions
C Check valve and union nut

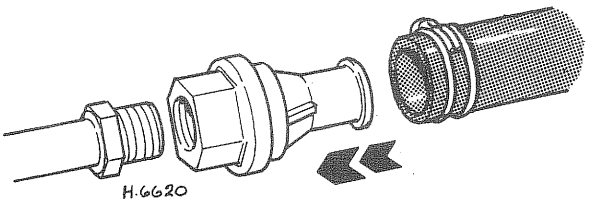


Fig. 3.27 Direction of airflow through check valve (Sec 34)

3 Operate the choke control, and air pressure at the disconnected hose should be cut off completely. If air can still be felt at the end of the hose, the diverter valve is faulty and should be renewed.
4 To remove the valve, slacken all the hose clips and detch the three air hoses and the small vacuum hose from the valve body.
5 Undo and remove the two retaining nuts and bolts and lift the valve off its mounting bracket.
6 Refitting is the reverse sequence to removal.

Cable operated type

7 The procedure for testing the cable operated diverter valve is the same as for the vacuum type described in paragraphs 1 to 3 inclusive of this Section. If the valve does not completely restrict the flow of air when the choke control is operated, make sure that the cable is correctly adjusted as described below and then carry out the test again. If the airflow is still not completely restricted renew the valve.
8 To remove the valve first slacken the cable retaining screw and slide the cable and retainer out of the valve operating lever.
9 Slacken the hose clips and detach the three hoses from the valve body; then lift the valve off the engine.
10 Refitting the valve is the reverse sequence to removal. With the valve installed adjust the operating cable as follows.
11 Observe the movement of the jet housing beneath the carburettor while an assistant slowly operates the choke control.
12 When the jet housing has moved down away from the adjusting nut by 0.010 to 0.015 in (0.25 to 0.38 mm), lock the choke control to hold it in this position.

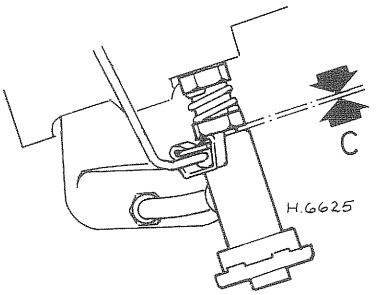


Fig. 3.28 Correct position of jet assembly when testing diverter valve operation (Sec 35)

C = 0.010 to 0.015 in (0.25 to 0.38 mm)

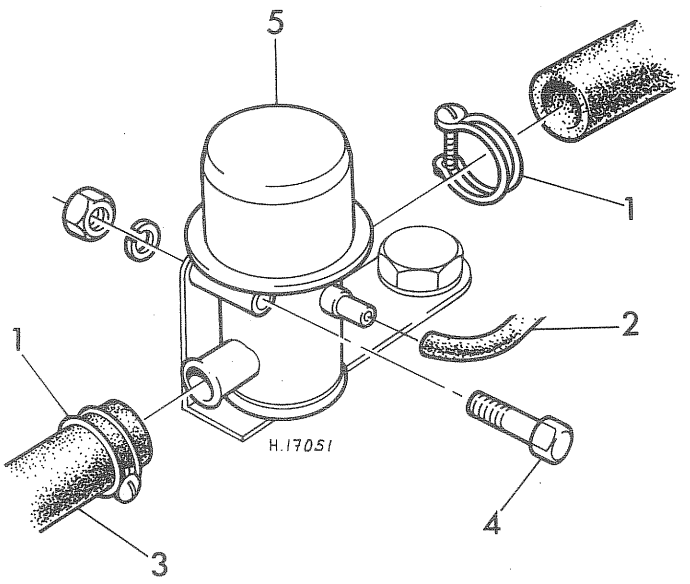


Fig. 3.30 Gulp valve removal (Sec 36)

1 Hose clips
2 Vacuum hose
3 Air hose
4 Retaining bolt
5 Gulp valve

13 The clearance between the diverter valve operating lever and the valve stem should now be 0.0015 to 0.003 in (0.04 to 0.08 mm). Adjust the position of the cable retainer to obtain this dimension.

36 Gulp valve – removal, testing and refitting

Note: *This component can only be tested satisfactorily using vacuum gauges. If the valve is suspect it is recommended that the testing is carried out by a BL dealer.*

1 To remove the gulp valve slacken all the hose clips, and detach the air hoses and the vacuum hose from the valve body.
2 Undo and remove the two retaining nuts and bolts and lift the valve off its mounting bracket.
3 Refitting is the reverse sequence to removal.

37 Fuel line filter – removal and refitting

1 Slacken the two retaining clips and detach the filter from the inlet and outlet hoses.
2 The filter cannot be dismantled for cleaning but must be renewed at the recommended service intervals.

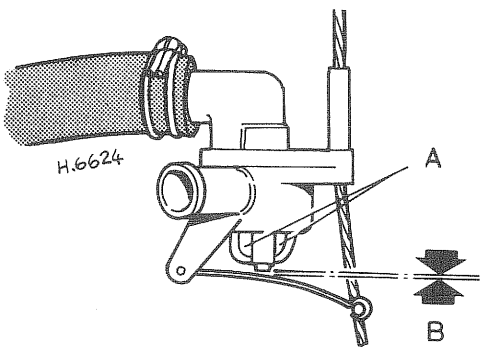


Fig. 3.29 Testing the diverter valve (Sec 35)

A Valve body
B = 0.0015 to 0.003 in (0.04 to 0.08 mm)

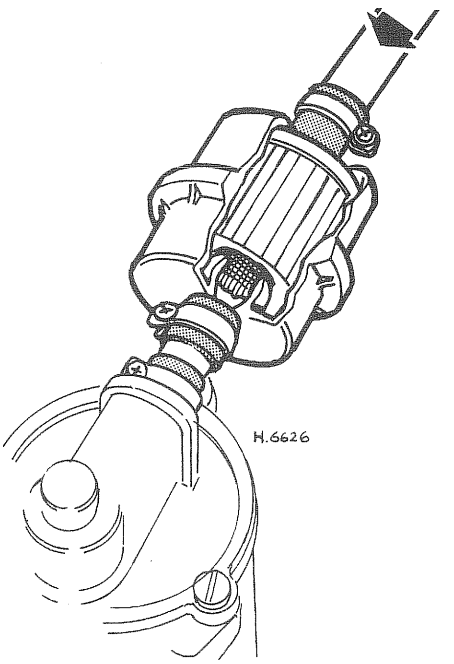


Fig. 3.31 Sectional view of the fuel line filter – arrow indicates direction of fuel flow (Sec 37)

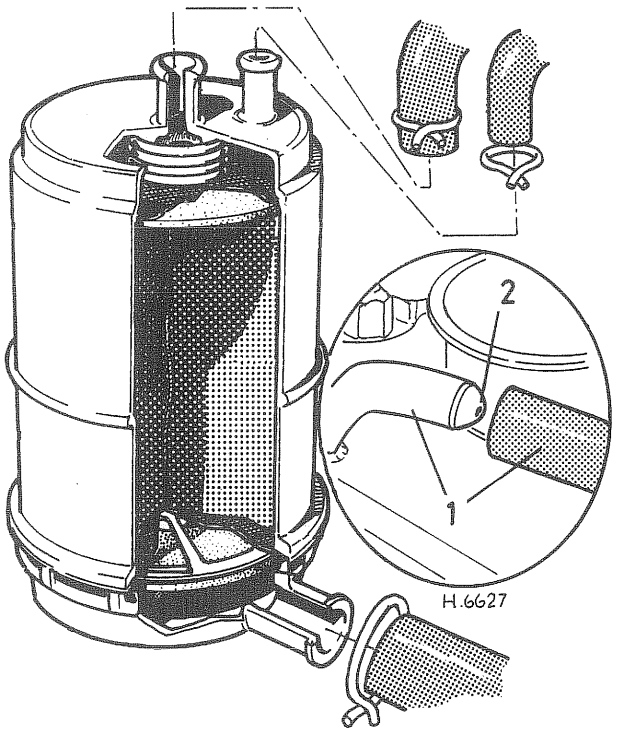


Fig. 3.32 Sectional view of the charcoal canister (Sec 38)

1 Purge hose connection at rocker cover
2 Restricted breather outlet

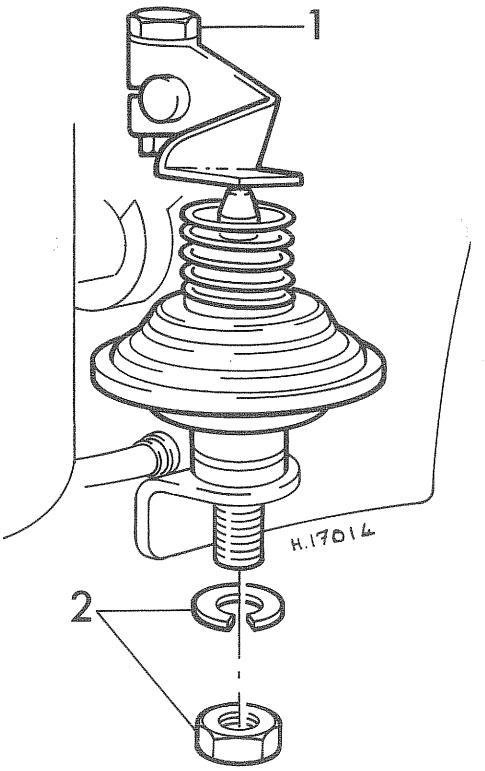


Fig. 3.33 Throttle damper assembly (Sec 39)

1 Contact lever retaining bolt
2 Damper retaining nut and washer

3 Refitting is the reverse sequence to removal. Ensure that the filter is fitted with the word 'IN' adjacent to the inlet hose; or if an arrow is stamped on the body, this must be towards the carburettor.

38 Charcoal canister – removal and refitting

1 Detach the air vent hose from the bottom of the canister, and the purge and vapour hoses from the top.
2 Undo and remove the retaining screw, open the retaining strap slightly and lift out the canister.
3 Do not attempt to open or clean the canister, but ensure that it is renewed at the recommended service intervals.
4 Refitting is the reverse sequence to removal. With the canister in place, detach the purge hose from the inlet elbow on the rocker cover. Clean the restrictor orifice with a short length of soft wire and then refit the hose.

39 Throttle damper – removal and refitting

1 Remove the air cleaner assembly as described in Section 2.
2 Slacken the nut and bolt securing the damper contact lever to the carburettor spindle.
3 Undo and remove the nut and spring washer securing the throttle damper to the mounting bracket. Lift the damper upward and off the bracket.
4 To refit the damper, position it on the mounting bracket and secure with the nut and washer.
5 Insert a 0.080 in (2.03 mm) feeler gauge between the contact lever and the damper plunger.
6 Press the contact lever downward until the damper plunger is fully compressed. Hold the lever in this position and tighten the retaining nut and bolt. Release the lever and remove the feeler gauge.
7 Refit the air cleaner assembly.

see overleaf for 'Fault diagnosis – fuel system'

40 Fault diagnosis – fuel system

Unsatisfactory engine performance and excessive fuel consumption are not necessarily the fault of the fuel system or carburettor. In fact they more commonly occur as a result of ignition and timing faults. Before acting on the following, it is necessary to check the ignition system first. Even though a fault may lie in the fuel system, it will be difficult to trace unless the ignition is correct. The faults below, therefore, assume that this has been attended to first (where appropriate).

Symptom	Reason/s
Difficult starting when cold	Fuel tank empty or pump defective Choke control inoperative or maladjusted Air cleaner blocked Float chamber flooding or fuel level too low Carburettor piston sticking
Difficult starting when hot	Fuel tank empty or pump defective Choke control sticking on Air cleaner blocked Carburettor piston sticking Float chamber flooding Air cleaner blocked Vapour lock (especially in hot weather or at high altitude) Carburettor maladjusted (mixture too rich)
Excessive fuel consumption	Leakage from tank, pipes, pump or carburettor Blocked air cleaner Carburettor maladjusted or float chamber flooding Carburettor worn
Fuel starvation	Level in tank too low (especially on hills) Leak on suction side of pump (air bubbles in fuel line) Level in float chamber too low, or needle valve sticking Fuel tank breather restricted Pump or carburettor filters blocked Pump defective or electrical connection loose (if applicable)