Fit the locating screw and locknut.

9 Place the rubber thrower in its groove on the spindle in front of the seal.

10 Coat the outside of the brass seal housing with a suitable water resistant jointing compound and fit it into the recess in the pump casting.

11 Push the seal into its housing with the carbon face towards the rear of the pump and ensure that it is seated correctly.

12 Press on the impeller as shown in Fig.2.11 until the rear face of the impeller is flush with the end of the spindle.

13 Press the fan hub on to the spindle until it is flush with the end.

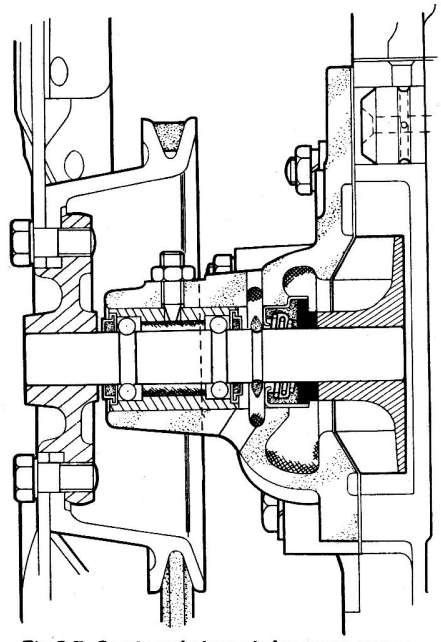

Fig.2.7. Sectioned view of the water pump

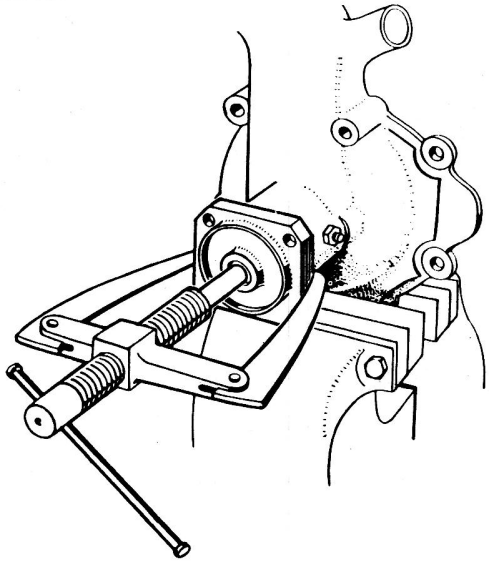

Fig.2.9. Withdrawing the fan hub from the spindle

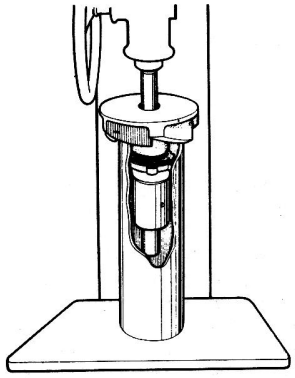

Fig.2.10. Removing the impeller from the pump spindle

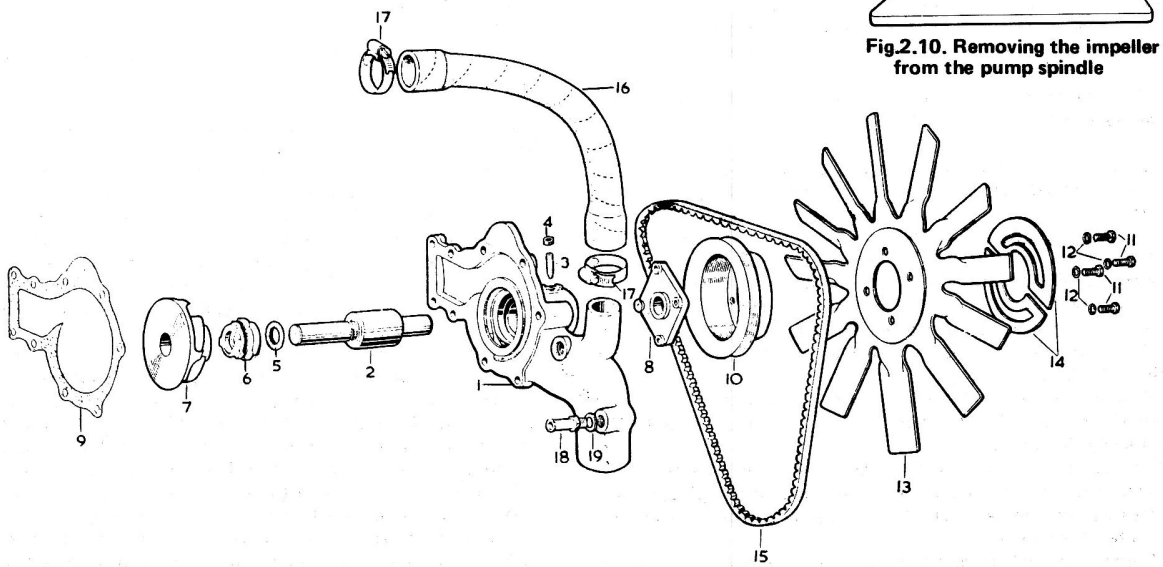

FIG.2.8. EXPLODED VIEW OF THE WATER PUMP

1 *Pump body*
2 *Spindle and bearing assembly*
3 *Allen headed screw*
4 *Locknut*
5 *Thrower*
6 *Seal*
7 *Impeller*
8 *Pulley carrier*
9 *Gasket*
10 *Fan pulley*
11 *Setscrew*
12 *Shakeproof washer*
13 *Fan*
14 *Balance piece*
15 *Fan belt*
16 *By-pass water hose*
17 *Clip*
18 *Adaptor for heater return pipe (2.4 litre shown)*
19 *Copper washer*

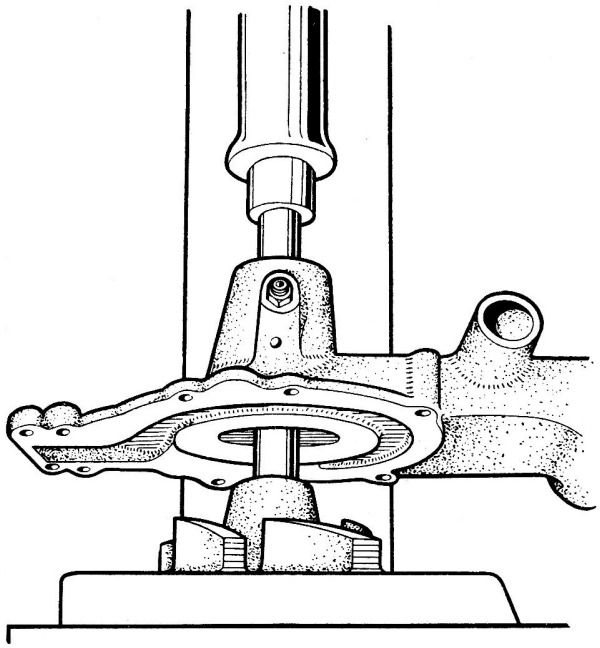

Fig.2.11. Fitting the impeller

13 Temperature gauge and thermal transmitter - general

The indicator head is attached to the instrument panel and in the case of Mk 1 models is connected by a capillary tube to a bulb located in the inlet manifold water jacket. The gauge, capillary tube and bulb are one unit and great care must be taken to ensure that the tube is not "kinked" or damaged in any way otherwise the whole unit will have to be replaced.

The indicator head of Mk 2, 240 and 340 models operates on a thermal principle using a bi-metal strip surrounded by a heater winding.

The transmitter unit is mounted in the inlet manifold water jacket adjacent to the thermostat.

14 Water temperature gauge Mk 1 models - testing, removing and refitting

1 If the instrument is thought to be faulty it can easily be checked by inserting the bulb into a container of water, heat up the water and check the gauge reading against an accurate thermometer placed adjacent to the bulb in the water.
2 To remove the temperature gauge assembly first partially drain the radiator.
3 Unscrew the water temperature gauge bulb from the inlet manifold water jacket by holding the flats on the bulb and unscrewing the union nut.
4 Remove the grommet at the rear of the engine compartment through which the capillary tube, and the oil gauge pipe, passes.
5 Release the capillary tube from its retaining clips, taking care not to bend the tube.
6 Remove the scuttle vent lever knob and remove all the screws from the dash casing. The casing can now be drawn outwards.
7 Remove both thumb screws from the top of the facia panel.
8 Remove the ignition keys and the cigar lighter.
9 Disconnect the battery.
10 Insert a piece of stiff wire into the hole in the side of the light switch to depress the plunger and the switch can now be withdrawn.
11 Repeat operation 10 to remove the wiper switch.
12 Remove the ashtray and remove both screws attaching the ashtray mounting bracket to the facia.
13 Remove the two large screws from the underside of the facia panel and the facia panel can now be removed by sliding it over the remaining switches.
14 Mark the relative positions of the three instrument panel securing bolts and remove them.
15 Ease the instrument panel forward into the car and unscrew the oil gauge union nut from the rear of the instrument.
16 Remove the two screws securing the temperature gauge to the instrument panel and withdraw the gauge into the car complete with the capillary tube and bulb.
17 Refitting is the reverse of the above procedure but taking care to see that the tube follows its original track and that it is not kinked when placing it on its clips.
18 Top up the cooling system with soft water.

15 Water temperature gauge thermal transmitter Mk 2, 240 and 340 models - testing, removing and refitting

1 If unsatisfactory gauge readings are being obtained, the thermal transmitter can be tested by removing the cable connection on the transmitter and placing the metal cable end on a good earthing point. Switch on the ignition and note the movement of the needle of the gauge, if it moves to a hot sector a new thermal transmitter should be fitted. If the needle fails to move then a break in the wiring or a fault in the gauge (which can be tested by substitution) will be the cause of the trouble.
2 To remove the thermal transmitter, partially drain the cooling system.
3 Disconnect the battery.
4 Unscrew the transmitter gland nut from the inlet manifold water jacket and remove the transmitter.
5 Refitting is the reverse procedure to removal.
6 For information on removal of the temperature gauge refer to Chapter 10.

16 Anti-freeze - mixture

During the winter months an anti-freeze compound with an inhibited Ethylene Glycol base should be used in the proportions laid down by the manufacturers of the anti-freeze mixture. It should be remembered, if an anti-freeze mixture is not used, that it is possible for the radiator to "freeze-up" whilst the car is being driven even through the water in the radiator was not frozen before the car was started.

Before adding anti-freeze solution, check all water unions and the tightness of the cylinder head bolts. Flush out the system as described in Section 3 and allow the system to drain. Close all drain taps. To ensure satisfactory mixing of the water and anti-freeze solution, measure the recommended proportions into a container and fill the system from this container rather than add the solution direct to the system. If "topping up" is necessary during the period that anti-freeze is in use, remember that the addition of straight water will dilute the mixture and so the required degree of protection against frost damage will be lost.

17 Fault diagnosis

Symptom	Reason/s	Remedy
Overheating	Insufficient water in cooling system	Top up radiator
	Fan belt slipping	Tighten fan belt to recommended tension or replace if worn.
	Radiator core blocked or radiator grille obstructed	Reverse flush the radiator, remove obstruction from grille
	Thermostat not opening properly	Remove and fit new thermostat.
	Ignition advance and retard incorrectly set (accompanied by loss of power and perhaps misfiring)	Check and reset ignition timing.
	Incorrect fuel/air mixture	Tune carburettors.
	Exhaust system partially blocked	Check exhaust pipe for obstruction.
	Oil level in sump too low	Top up to correct level.
	Blown cylinder head gasket (water/steam being forced down the radiator overflow pipe under pressure)	Remove cylinder head and fit new gasket.
	Engine not yet 'run-in'	Run-in slowly and carefully.
	Brakes binding	Check and adjust brakes.
Engine running 'cold'	Thermostat jammed open	Remove and renew thermostat.
	Incorrect grade of thermostat fitted	Remove and replace with correct type of thermostat.
	Thermostat missing	Check and fit correct thermostat.
Leaks in system	Loose clips on water hoses.	Check and tighten clips.
	Top or bottom water hoses perished	Check and replace any faulty hoses.
	Radiator leaking	Remove radiator and repair.
	Thermostat gasket leaking	Inspect and renew gasket.
	Pressure cap spring worn or seal ineffective	Renew pressure cap
	Cylinder wall or head cracked	Dismantle engine and despatch to engineering works for repair.
	Core plug corroded	Remove old plug and fit new item.

Chapter 3 Fuel system and carburation

Contents

Specifications

Air cleaner		
Type	2.4 litre Mk's 1 and 2 - oil bath (early models - wiremesh) 3.4/3.8 litre - wire mesh and oil bath (early models) paper element (later models) 240/340 - paper element	
Carburettor		
Type	2.4 litre Mk's 1 and 2 - twin Solex B32 PBI-5 240 - twin SU HS6 1¾" 3.4/3.8/340 - twin SU HD6 1¾"	
Solex B32 PBI-5	Compression ratio	
	7 to 1	8 to 1
Choke and jet sizes		
Choke	23 mm	24 mm
Main jet	110	110
Air correction jet	200	180
Emulsion tube	14	14
Pump jet	55	55
Pilot jet	50	50
Pilot air bleed	1.2 mm	1.2 mm
Needle valve	1.5 mm	1.5 mm
Needle valve washer	1 mm	1 mm
Starter petrol jet	GS.105	GS.105
Starter air jet	GA.4.5	GA.4.5

		Air cleaner	
		Oil bath	Paper element
SU HD6 Needles			
3.4 litre	7 to 1 comp ratio	SC	TM
	8 to 1 comp ratio	SC	CI*
	9 to 1 comp ratio	SC	CI*
3.8 litre	7 to 1 comp ratio	TX	TM
	8 to 1 comp ratio	SC	CI*
	9 to 1 comp ratio	SC	CI*
340	8 to 1 and 9 to 1 comp ratio		CI or TL

* Early cars fitted with TU needles

Jet size	0.10 in (2.54 mm)
Auxiliary starting carburettor - needle type	425/8
SU HS6 Needles	
240 all models	TL
Jet size	0.10 in (2.54 mm)
Fuel pump	
Type	SU electrical — Early models HP type AUA.52, AUA.152, AUB.152; Later models AUF.301, AUF.303
Fuel tank	
Type	Flat tank under rear floor vented through filler cap
Capacity	12 Imp gallons (54½ litres)

1 General description

A lay-out of the fuel system is shown in Fig.3.1. It consists of a fuel tank at the rear of the car, an electrical fuel pump located in the luggage compartment and twin curburettors, Solex in the case of the 2.4 litre range and SU for all other models. The 2.4 litre Mk's 1 and 2 cars are fitted with an oil bath type of air cleaner but early models had a wire mesh type. Early model 3.4 and 3.8 litre cars were fitted with wire mesh or oil bath air cleaners but later models, and the 240 and 340, have a disposable paper element type. Irrespective of the type of air cleaner in use it should be serviced at the recommended periods. Operation of the individual components is described eleswhere in this Chapter.

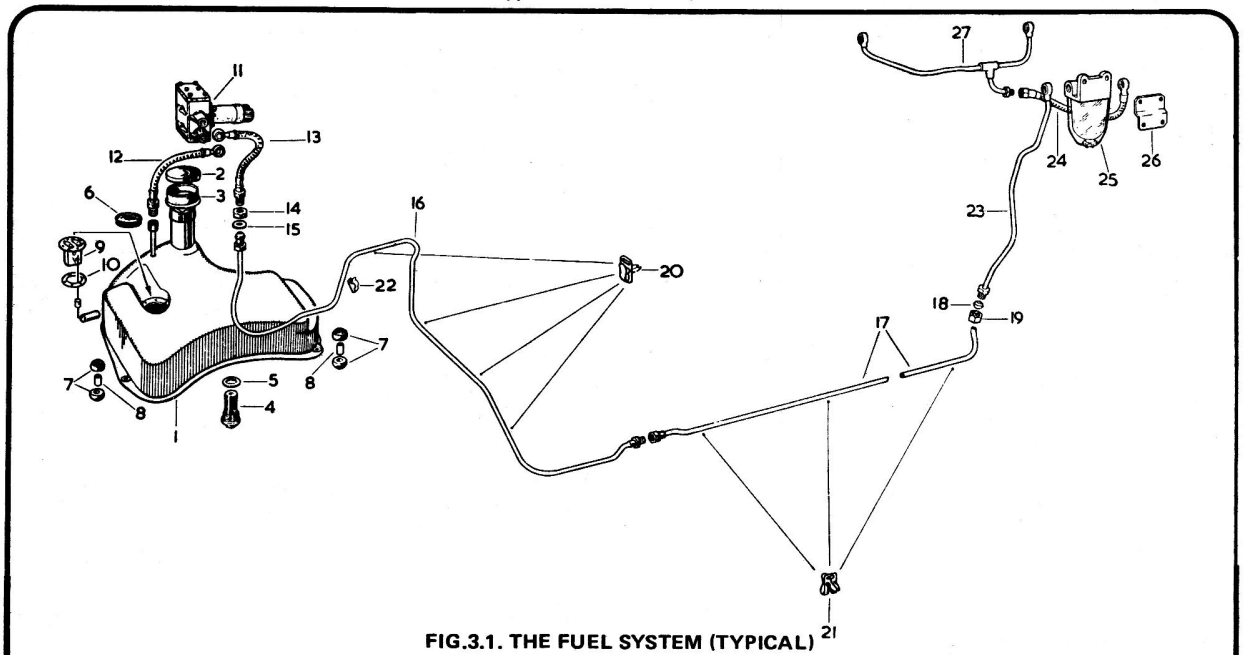

FIG.3.1. THE FUEL SYSTEM (TYPICAL)

1 *Petrol tank*
2 *Filler cap*
3 *Rubber grommet*
4 *Petrol tank filter*
5 *Gasket*
6 *Rubber grommet*
7 *Rubber mounting pad*
8 *Distance tube*
9 *Petrol tank element unit*
10 *Gasket*
11 *Petrol pump*
12 *Flexible petrol pipe*
13 *Flexible petrol pipe*
14 *Flexible pipe securing nut*
15 *Washer for nut*
16 *Rear petrol feed pipe*
17 *Front petrol feed pipe*
18 *Union olive*
19 *Union nut*
20 *Rear petrol pipe securing nut*
21 *Front petrol pipe securing nut*
22 *Rear petrol pipe edge clip*
23 *Intermediate petrol filter pipe*
24 *Petrol filter flexible pipe*
25 *Petrol filter*
26 *Mounting bracket*
27 *Carburettor feed pipe*

2 Fuel pump - general description

A sectioned view of the type of fuel pump fitted to early model cars is given in Fig.3.2. The pump consists of three main assemblies - the body, the magnet assembly (sometimes referred to as the coil housing assembly) and the contact breaker.

The body (A) is an aluminium casting to which is attached two indentical lids ("B" the top and "C" the lower). The lower lid retains the filter and the top lid gives access to the cage "D" for the outlet valve "E", and, when the cage is unscrewed, to the inlet valve "F" also. These inlet and outlet valves are thin brass discs and should be assembled smooth side downwards. It is rarely necessary to remove the outlet valve but it can be extracted after the spring circlip has been detached, care should be taken not to distort this circlip or the valve lift may be affected.

There is a space between the valves and the pumping chamber which is a shallow depression one face of the body casting. This space contains the diaphram unit "J" which is clamped on its rim between the iron coil housing "K" and the main body "A".

A bronze rod "L" is screwed to the centre of the armature "M", to which the diaphragm is also fastened and it passes through the magnet core "N" to the trunnion "O" in the contact breaker. An armature return spring "P" is interposed between the armature and the end of the magnet coil.

The magnet consists of a cast iron housing "K" having an iron magnet core "N" on which is wound a coil of copper wire "Q" which energises the magnet. Between the magnet coil housing "K" and the armature "M" are fitted eleven spherical edged rollers "R", these locate the armature centrally within the magnet and allow absolute freedom of movement in a longitudinal direction. The contact breaker is a small bakelite moulding "S" carrying two rockers, an inner rocker "T" and an outer rocker "U", these are both hinged to the moulding at one end are connected together at their top end by two small springs arranged to give a "throw over" action. A trunnion bearing "O" is fitted into the centre of the inner rocker and the bronze armature sliding rod "L" is screwed into it. The outer rocker is fitted with tungsten points and these make contact with the corresponding points on the spring blade "V", this blade is connected to one end of the coil and the other end of the coil is connected to the terminal screw "W". The outer rocker is connected by a short length of flexible wire to one of the screws which holds the bakelite moulding and thus provides an earth. Arcing at the contact breaker is reduced by a condenser which is fitted in parallel with the points.

The pump operates as follows; when at rest the outer rocker lies in the outer position and the tungsten points are in contact. When the ignition is switched on, current passes from the terminal, through the coil, back to the blade, through the points and to earth, thus energising the magnet and attracting the armature. The armature moves forward and brings the diaphragm with it thus creating a vacuum and sucking the petrol through the suction valve into the pumping chamber. When the armature has advanced nearly to the end of its stroke, the "throw over" mechanism operates and the outer rocker flies back and so separates the points and breaks the circuit. The spring "P" then pushes the armature and the diaphragm back, forcing petrol through the delivery valve at a rate determined by the requirements of the engine. As soon as the armature gets near the end of this stroke, the "throw over" mechanism again operates, the points again make contact and the cycle of operations is repeated.

The spring blade rests against a small projection on the bakelite moulding, and it should be set so that when the points are in contact it is deflected back from the moulding. The width of gap at the points is approximately 0.030" (0.75 mm), when the rocker is pulled back against the face of the iron housing. If the magnet is removed from the body for any reason, care must be taken that the rollers "R" do not fall out.

The above description also applies to a short body version of

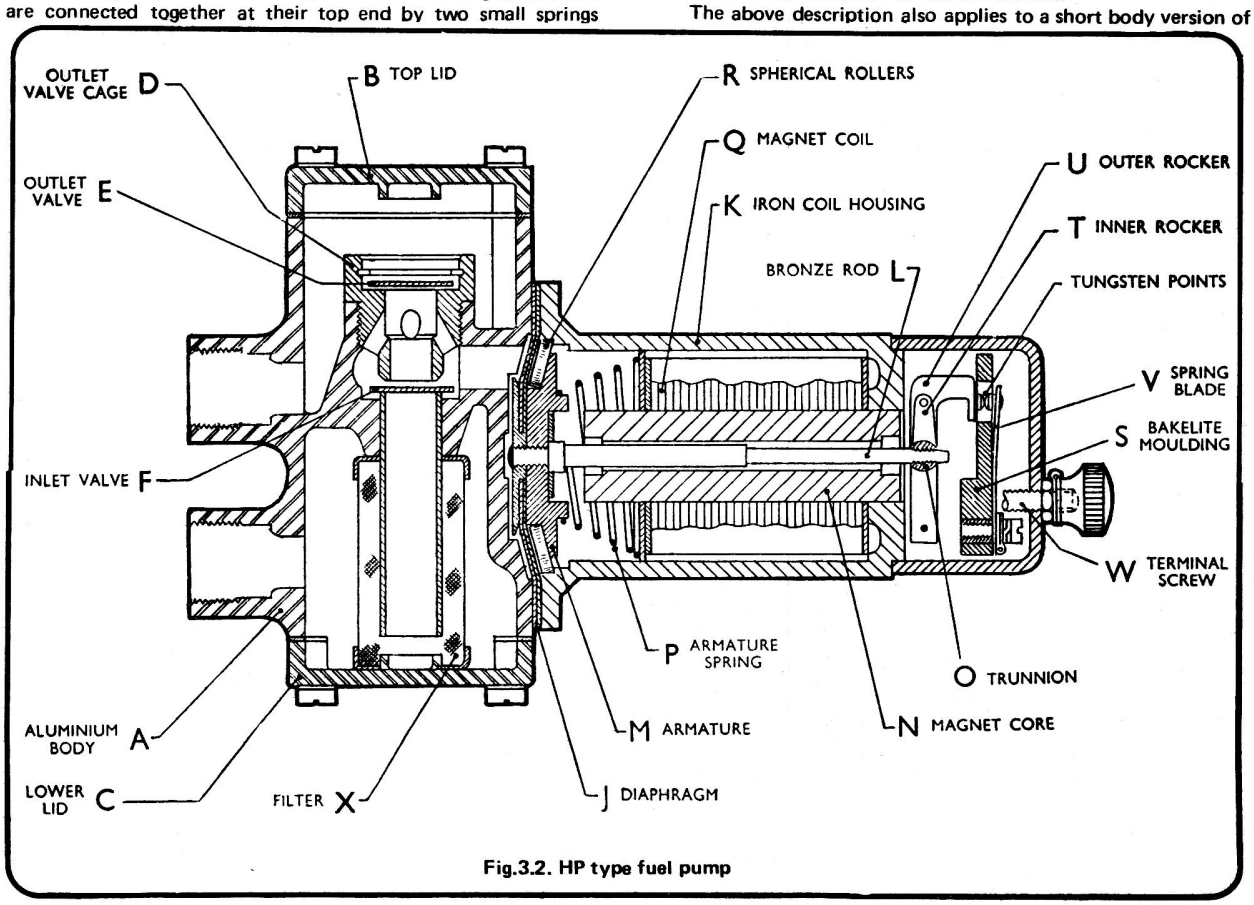

Fig.3.2. HP type fuel pump

pump which was introduced for later Mk 2 models. The coil housing of this pump is approximately 2¼" in length compared to 2¾" of the earlier type. However, the above pumps were superseded by the AUF. 301 (late model Mk 2 and 3.8 litre cars) and by the AUF .303 as fitted to 240 and 340 models but which may also be found on the other range of cars. These pumps differ considerably from the pump described above as will be seen from the sectioned drawing (of the AUF.301) which is shown at Fig.3.3. This pump also comprises three main assemblies: the main body casting "A", the diaphragm armature and magnet assembly "M" contained within the housing, and the contact braker assembly housed within the end cap "T2". A non-return valve assembly "C" is fixed to the end cover moulding to aid the circulation of air through the contact breaker chamber. The main fuel inlet "B" is maintained in communication with an inlet air bottle "I".

Communication with the main pumping chamber "N" is provided by an inlet valve assembly, this assembly comprises a Melinex valve disc "F" permanently assembled within a pressed steel cage, which, in turn is held in place by a valve cover "EI", while the outlet from the pumping chamber is provided with an identical valve assembly reversed in direction. Inlet and outlet valve assemblies and filters are held in position by a clamp plate "H", both valve assemblies may be removed by detachment of the clamp plate after removing the self tapping screws shown on the lower diagram in Fig.3.3. A filter "E" is provided upstream of the inlet valve assembly. The delivery chamber "O" is bounded by a flexible plastic spring loaded diaphragm "L" contained by the vented cover "P". The rubber sealing ring "L2" seals the diaphragm "L".

The magnetic unit consists of an iron coil housing an iron core "Q", an iron armature "AI" which is provided with a central spindle "PI" and is permanently united with the diaphragm assembly "LI", a magnet coil "R" and a contact breaker assembly comprising parts "P2", "UI", "U", "TI", "V" etc. Between the coil housing and the armature are located 11 spherically edged rollers "S" which locate the armature "AI" centrally within the coil housing and so allow absolute freedom of movement in a longitudinal direction .

The contact breaker consists of a bakelite pedestal moulding "T" carrying two rockers "U" and "UI" which are both hinged to the moulding at one end by the rocker spindle "Z" and interconnected at their top ends by two small springs arranged to give a "throw-over" action. A trunnion "P2" is carried by the inner rocker and the armature spindle "PI" is screwed into the trunnion. The outer rocker "U" is fitted with two tungsten points which contact with two tungsten points carried by the spring blade "V" which is connected to one end of the coil whilst the other end of the coil is connected by a short length of wire, "X", to one of the screws which hold the pedestal moulding onto the coil housing and this provides an earth return to the body of the pump which must, in turn, be thoroughly earthed to the body of the vehicle by the earthing terminal provided on the flange of the coil housing.

The action of the pump is that when it is at rest the outer rocker "U" lies in the postion illustrated with the tungsten points in contact. When the ignition is switched on, current passes from the connector "W" through the coil and back to the blade "V", through the points and so to earth, thus energising the coil and attracting the armature "AI". The armature, together with the diaphragm assembly then retracts and so creates a vacuum to suck fuel from the tank into the pumping chamber "N" through the inlet valve. When the armature is close to the end of its stroke, the throw-over mechanism operates and the outer rocker moves rapidly backwards, thus separating the points and breaking the circuit. The spring "SI" then pushes the armature and diaphragm away from the coil housing and so forces fuel through the delivery valve at a rate according to engine requirements. As the armature approaches the end of its stroke the throw-over mechanism again operates, the tungsten points again make contact and the cycle of operations is repeated. The spring blade "V" rests against the small projection moulding "T" and it should be set so that when the points are in contact it is deflected away from the moulding. The extent of the gap at the points should be approximately 0.030" (0.75 mm) when the rocker "U" is manually deflected until it contacts the end face of the coil housing.

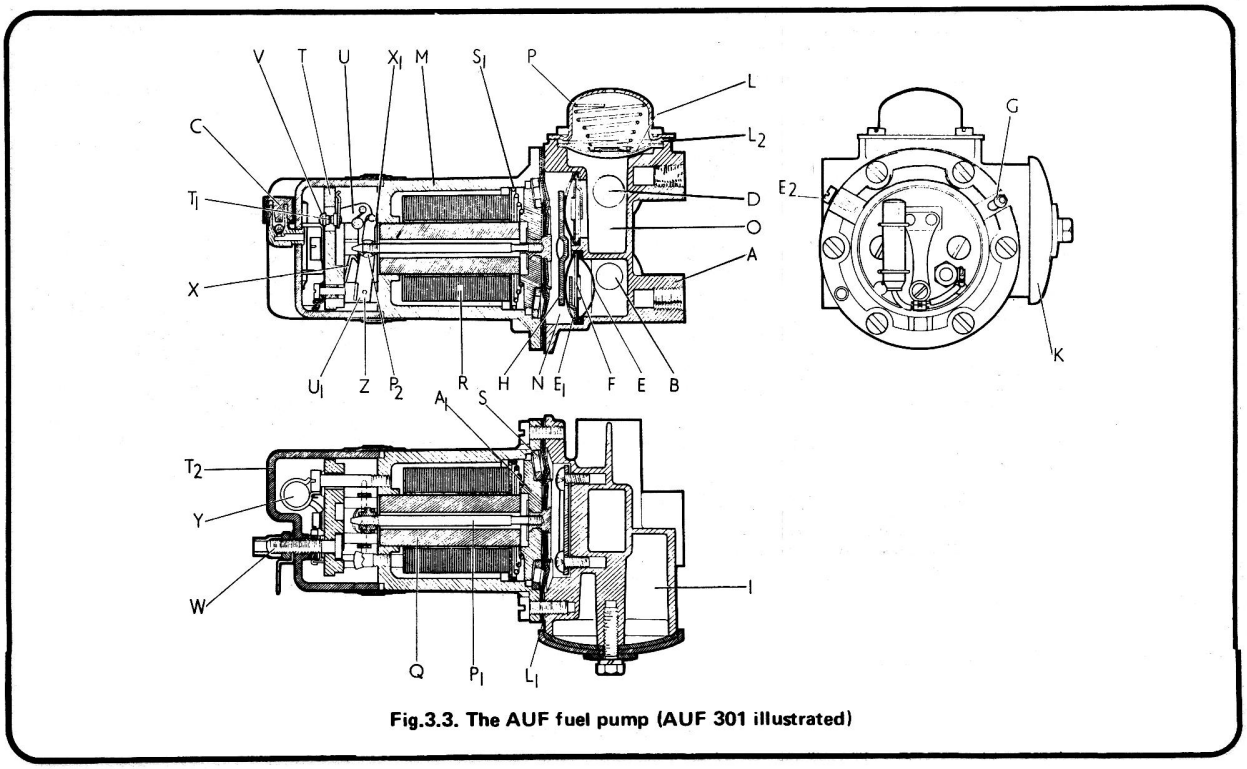

Fig.3.3. The AUF fuel pump (AUF 301 illustrated)

3 Fuel pump - removal and replacement

1 Disconnect the battery.
2 Disconnect both inlet and outlet fuel pipes, from the side of the pump by withdrawing the banjo bolts and washers.
3 Disconnect the electrical feed to the pump by unscrewing the knurled knob at the end of the pump.
4 Disconnect the earth cable from the side of the pump.
5 Remove the two self locking nuts attaching the pump to its bracket and withdraw the washers from each stud.
6 The pump may now be withdrawn from the bracket leaving the two rubber grommets in position.
7 Refitting is the reverse of the above procedure but the two rubber grommets should be examined for deterioration and replaced if necessary, otherwise excessive pump noise may result.

4 Fuel pump - dismantling

The general procedure for dismantling the three types of pump (HP type long and short body and the AUF type of pump) is very similar but, where differences occur, separate details are given.
1 Ensure that the outside of the pump, the bench and your hands, are clean.
2 Refer to Figs. 3.2 and 3.3.
3 Remove the nut and washer from the terminal screw "W" and the cover sleeve seal (if fitted).
4 Remove the end cover and the spring blade "V".
5 Mark the relative position of the coil housing and the body. Remove the six set screws which secure the coil housing and body and separate them. The edges of the diaphragm are now free and the spherical rollers, "R" in Fig.3.2 and "S" in Fig.3.3 should be removed.
6 Unscrew the diaphragm unit (J or LI) anti-clockwise, note that the rod and diaphragm are not separable.
7 Remove the nut from the terminal screw and the lead washer beneath it. Remove the two pedestal screws and release the pedestal.
8 Disconnect the electrical leads after noting their position for reassembly.
9 Push out the rocker spindle pin ("Z" in Fig.3.3) to release the rocker assembly which cannot be dismantled any further. DO NOT remove the toggle springs.
10 **On the HP type pump,** remove the six screws retaining the top lid, unscrew the valve cage "D" and remove the inlet valve "F". The brass outlet valve "E" is removed from the cage after removing the circlip.
11 Remove the lower lid "C" to gain access to the filter.
12 **On the AUF type pump** both the valve assemblies can be removed by unscrewing the two self tapping screws securing the plate "H". The valves are of Melinex plastic as opposed to brass in the HP type pump. Note that the filter "E" is incorporated with the inlet valve.
13 It is unnecessary for the cover "P", the spring loaded diaphragm "L", the perforated disc and rubber sealing ring "L2" to be dismantled.

5 Fuel pump - examination

1 Examine the contact points for burning or pitting. If the points are defective, the rocker assembly and spring blade should be renewed.
2 Check that all electrical leads and tags are in good condition.
3 Examine the diaphragm for deterioration. Renew it if its condition is at all doubtful.
4 Clean the filter and examine it for damage looking especially for cracks.
5 Check the condition of the valves on HP pumps and renew them if doubtful of their condition.
6 Examine the Melinex valves of the AUF type pump and check that they seat properly. Note that the retaining tongue on the cage should allow the valve to lift approximately 1/16".
7 Examine the valve seatings and if they are pitted the body will have to be replaced.
8 Check that the non-return valve "C", which aids the circulation of air through the contact breaker chamber, is free.

6 Fuel pump - reassembly

1 Fit the rocker assembly to the pedestal with the rocker spindle pin. Ensure that the rockers are free in action, this may require slight lubrication of the pivots.
2 Fit the terminal screw "W" to the pedestal and then fit the double coil spring washer, the cable tag, the new lead washer and the nut in that order. Tighten the nut. (see Fig.3.4 for assembly detail).
3 Fit the two pedestal screws and the earthing lead tag and re-attach the pedestal, hold the tag against turning with the screw and do not overtighten or the pedestal may be fractured.
4 Fit the impact washer over the diaphragm rod to enter the recess in the armature, "M" in Fig.3.2 and "AI" in Fig.3.3. Fit the large diameter of the armature spring into the coil housing. Enter the thread of the diaphragm rod into the trunnion, "O" in Fig.3.2 and "P2" in Fig.3.3. Turn the diaphragm clockwise until the rocker will just not throw over.
5 Hold the coil housing vertical with the diaphragm uppermost, turn back the edge of the diaphragm and fit the eleven spherical edged rollers.
6 Hold the unit horizontally as shown in Fig.3.5. Unscrew the diaphragm one sixth of a turn at a time (one hole), press the diaphragm in and release slowly and firmly (not jerkily) until the "throw-over" mechanism operates. Unscrew a further turn (five to six holes) for the long body HP pump, and unscrew a further 1¼ turns (seven holes) for the short body HP and for the AUF pumps.
7 The body may now be fitted to the coil housing.
8 **The following paragraphs apply to HP pumps** - assemble the body to the housing in its original position. Engage the six set screws finger tight at this stage. Fit the spring contact blade and adjust and tighten it so that each contact point wipes over the centre line of the other point and not to one side of either contact. The diaphragm must now be stretched to its outermost position and this is most easily done by inserting a matchstick behind one of the white fibre rollers on the outer rocker, thus holding the points in contact. If a current is now passed through the pump, the magnet will be energised and will pull the armature and diaphragm forward and whilst it is in this position the six setscrews should be tightened down. Alternatively the diaphragm can be stretched by using a diaphragm stretching tool as illustrated in Fig.3.6. This is a steel wedge which is inserted under the trunnion "O" in the centre of the inner rocker in order to stretch the diaphragm to its outermost position. Fig.3.7 illustrates the tool in position.
9 Check the gap between the white rollers and the coil housing, as shown in Fig.3.8, by holding the spring blade against the projection "B". The tip of the blade should be "set" to obtain the correct clearance.
10 Refit the inlet valve, the outlet valve cage, the outlet valve, the retaining circlip and the top lid.
11 Refit the filter and the bottom lid.
12 The following paragraphs apply to AUF type pumps - Fit the valves and their retaining plate. Make sure that each is the right way round for inlet and outlet and that the filter is fitted below the inlet valve.
13 Attach the body in its original position to the coil housing and fully tighten the six securing setscrews.
14 Check that the top of the inner rocker "UI" has made contact with the end face of the coil housing as indicated at "XI". If there is a visible, or measurable, gap then the six screws should be slackened off and retightened until the condition of contact at "XI" is obtained.
15 Fit the soring blade and position it so that when the outer

rocker operates to make and break contact between the tungsten points the one pair of points wipes over the centre line of the other pair in a symmetrical manner.
16 Set the spring blade to give a gap of 0.030" (0.75 mm) between the points when the rocker "U" is manually deflected and touches the end face of the coil housing.
17 Fit the cover and sealing sleeve.

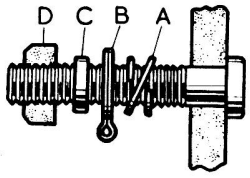

FIG.3.4. THE TERMINAL ARRANGEMENT

A Double coil spring washer C Lead washer
B Cable tag D Countersunk nut

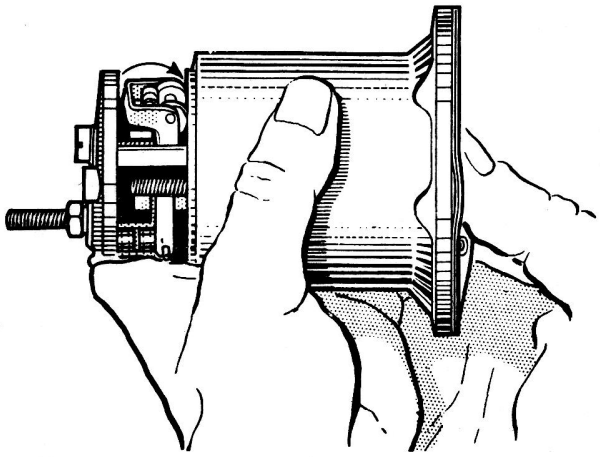

Fig.3.5. Checking 'throw-over' of the toggle mechanism

7 Fuel pump - fault finding

1 If fuel is not reaching the carburettors, first check that the fuel tank venting is not blocked.
2 Disconnect the delivery pipe to the carburettor and switch on the ignition. If the pump works, the trouble is probably due to a sticking needle in the float chamber.
3 If the pump does not work, disconnect the lead from the terminal and strike against the body of the pump to see if it sparks and, therefore, if any current is available. If there is current there, remove the cover of the pump and touch the terminal with the lead when the points are in contact. If the pump fails to work it may be due to dirt on the contact faces. This may be cleaned off by inserting a thin piece of card between the contacts and working it to and fro.
4 If the pump still fails to work after cleaning the contacts, check that the bottom filter is not blocked.
5 If the filter is clear, slacken off the inlet pipe union and if the pump operates when the ignition is switched on the trouble is probably due to an obstruction in the pipe line to the tank. It may be possible to clear the obstruction by blowing down the pipe with a foot pump.
6 If the pump does not operate after slackening the inlet union, slacken the outlet union. Switch on and if the pump operates the fault will be due to an obstruction in the pipe line between the pump and the carburettors. Check that the glass petrol filter unit in the engine compartment is clear. If it is clear, the fault will lie in the pipe line itself and a blow down with a foot pump will probably clear the trouble.
Note: Under no circumstances must compressed air be applied to the pump as this will damage the valves.
7 If, when either union is slackened off, the pump does not operate or only works slowly or spasmodically, then the trouble is due to a fault in the pump itself, such as a stiffened up diaphragm or undue friction in the throw-over mechanism or a combination of both.
8 To check the above, unscrew the six screws and detach the coil housing and rocker unit from the main body. Take care not to lose any of the rollers under the diaphragm.
9 Press on the diaphragm gently and firmly and observe whether the throw-over mechanism seems to operate freely. If it does not, lubricate sparingly, with a drop of thin oil, where the steel spindles pass through the brass rockers.
10 Now, to restore the original pliability of the diaphragm, ruckle each of the two fabric layers vigourously between the thumb and fingers. Reassemble and carefully set the throw-over as described in Section 6 paragraph 6.
11 If the pump becomes noisy in operation, look for an air leak on the suction side. The simplest way to check for this is to disconnect one of the carburretor feed pipes and allow the pump to discharge petrol into a glass jar until the pipe is immersed in petrol. If bubbles are seen to come through the pipe there must be an air leak which must be traced and cured.
12 If the pump keeps operating but does not deliver any fuel, thefault is probably due to a piece of dirt trapped under one of the valves which will mean dismantling and cleaning the pump as already described.
13 If the pump overheats in operation, the fault will probably be due to an obstruction on the suction side.

8 Petrol tank - removal and refitting

It is not essential to drain the tank before removal as it can be lowered vertically from its mounting.
1 Raise the rear of the car to allow work to be carried out underneath.
2 Remove the three (two on the 2,4 litre) exhaust silencer mountings. Remove the bolts securing the exhaust tail pipe to the rear body coupling, the exhaust pipe(s) will now fall clear of the petrol tank.
3 Open the petrol filler door on the left hand rear wing and remove the filler cap.
4 Disconnect the flexible petrol pipe from the tank by unscrewing the union above the large grommet located on the trim panel on the left hand side of the luggage compartment.
5 Remove the cover of the petrol gauge tank unit on the left hand side of the luggage compartment floor and disconnect the three cables. Note their position for reassembly.
6 Remove the three self locking nuts attaching the tank to the body. Take the weight of the tank and remove the mounting rubbers and washers.
7 Lower the tank to the floor and remove the remaining distance pieces, rubber pads and washers from the tank mounting studs; note their position for reassembly.
8 Refitting is the reverse of the removal procedure but ensure that the rubber mounting washers are correctly positioned and have an assistant to ensure that the electrical cables are drawn up through the cover plate aperture as the tank is offered up to its mounting. To ensure that the cable connectors are correctly attached to the blade terminals, slide back the insulating sleeve and push the connector fully onto the blade. Push back the insulating sleeve to cover the joint.

9 Petrol gauge, tank unit - removal and refitting

1 The tank unit cover plate is located on the left hand side of the luggage compartment. Remove the plate by lifting the spring steel strip.

2 Disconnect the electrical cables. Note their position for reassembly.
3 Remove the six setscrews (and earth wire) and the twelve copper washers which attach the unit to the petrol tank.
4 Break the seal by a sharp tap on one side of the unit. Withdraw the unit taking care not to damage the float arm.
5 To refit the unit, first remove the old gasket and any sealing compound from the boss on the petrol tank taking care that none falls into the tank.
6 Use a new gasket and apply a suitable sealing compound to both sides. Position the gasket on the petrol tank boss with the holes in line.
7 Insert the element into the tank so that the float is towards the front of the car.
8 Replace the six screws and twelve washers and tighten securely.
9 Slide back the insulating sleeve from the cables and push the connectors fully home on the blades from which they were removed (should be white/green cable to terminal marked "W" at the front of the unit and the green/black cable to the terminal marked "T" at the rear).
10 Remove one of the screws on top of the element housing and secure the black earth wire.
11 Replace the unit cover plate.

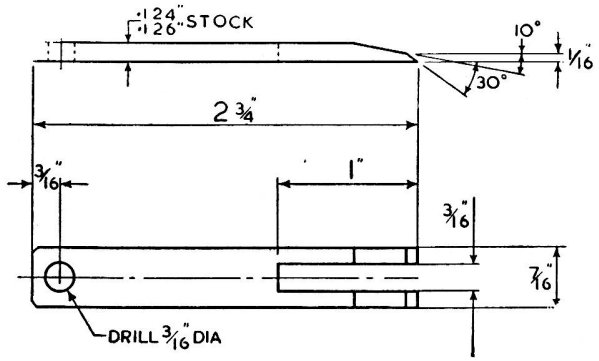

Fig.3.6. The diaphragm stretching tool

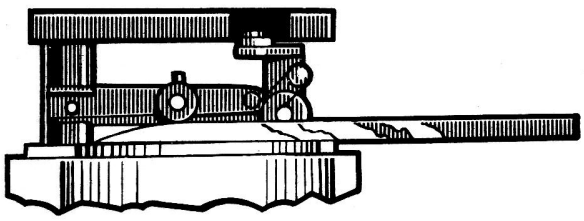

Fig.3.7. The diaphragm stretching tool in position

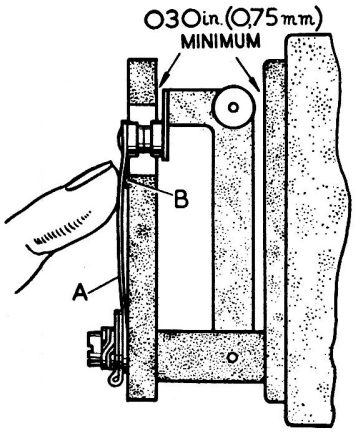

Fig.3.8. Checking the gap of the rollers

10 Carburettor Solex B.32 PB - 5 - description

The 2.4 litre model is equipped with twin Solex B.32 PB-5 carburetters. This type of carburetter is fully dust proofed (by the air cleaner) and has a progressive starting device with fast idle; it also incorporates an anti-percolation device and accelerator pump. For idling, the mixture is supplied to the engine past the butterfly and from the pilot jet and the pilot jet air bleed.

Engine speed can be varied by a slow running adjustment screw which opens or closes the throttle as required whilst adjustment of the volume control screw varies the mixture strength and volume from the pilot jet and the pilot air bleed. For normal running, petrol is supplied from the float chamber through the main jet to the main well where it is mixed with air metered through the air correction jet and carried into the well via the emulsion tube. The mixture is then discharged from the main spraying well into the air stream passing through the choke tube. An accelerating and economy pump is attached to the float chamber and is operated by inter-connected throttle linkage. The main components of this unit are a membrane and spindle, a return spring, an inlet valve and a spring controlled outlet valve. When the accelerator is released, the membrane is pushed back by the spring, thereby drawing in petrol via the inlet valve. When the accelerator is depressed, the membrane is pushed forward and this causes the petrol in the pump to close the inlet valve and, calibrated through the pump jet, it is then discharged into the main air stream via the injector tube. The pump has the additional function of supplementing the output of the main jet for full power, for, when the throttle is fully held open the pump lever holds the membrane forward, which in turn keeps the inlet valve open, thus creating an open circuit through which petrol is drawn by engine depression via the injector tube. Easing the accelerator to return to normal cruising closes the outlet valve and stops the supplementary supply.

11 Carburetters Solex - removal and replacement

1 Bend the rubber seal, which joins the air intake pipe to the air cleaner, back on to the air cleaner flange.
2 Disconnect the air intake steady bracket and the air intake pipe can now be removed by applying steady pressure under the centre. Do not lose the two connecting sleeves from the top of the carburettors.
3 Remove the three bolts securing the air cleaner to the mounting bracket and remove the air cleaner (if desired).
4 Disconnect the distributor vacuum feed pipe from the front carburettor by unscrewing the union.
5 Disconnect the accelerator linkage from the throttle spindle.

6 Remove the two retaining setscrews from the mixture control levers. Remove the outer cable retaining setscrew. The control cable can now be withdrawn from the carburettors.
7 Disconnect the fuel feed pipes by undoing the banjo bolts. Note the washers and gauze filters, place these where they will not be lost.
8 Remove the two carburettor flange securing nuts, collect the spring washers.
9 Lift off the carburettors. Note the position of the two insulating distance pieces and the gasket, remove and discard them.
10 Refitting is the reverse of the removal procedure but fit two new insulating distance pieces and a new gasket to ensure against air leaks.
11 To refit the mixture control, ensure that the mixture level in the car is set at "RUN" and that the control levers on the carburettors are in the fully forward position. Thread the control wire into position and remember to replace the distance tube between the two choke levers (see Fig.3.10).

12 Carburettor (Solex) - dismantling and reassembly

1 Refer to Fig.3.11. The carburettors can be dismantled to the extent necessary for routine cleaning of jets and the float chamber without removing them from the engine. Proceed as follows.
2 Remove the air cleaner and the air intake pipe as described in Section 11.
3 Disconnect the fuel feed pipes to the carburettors by unscrewing the banjo bolts (Bb Fig.3.11) collect the washers and filter gauzes.
4 Unscrew the float chamber cover fixing screws and carefully remove each cover ("Fc").
5 The needle valves ("Nv") are now exposed and can be removed.
6 Lift and remove the float toggles (Ft), the spindles (Fs) and the floats (F).
7 Remove the pilot jet (g), the pump jet (Gp) and the starter jet which is situated at the bottom left hand side of the starter box and illustrated as item 20 in Fig.3.9.
8 Remove the pump non-return valve and gauze located at the base of the pump chamber (item 9 in Fig.3.9).
9 Remove the plug (Gu) and the main jet located in the bolt (T).
10 Remove the air correction jets (a) but before doing so ensure that the throttles are closed in case you accidentally drop any parts.
11 The emulsion tubes may now be lifted out using a matchstick.
12 It is rarely necessary that further dismantling of the carburettor is required but if it is desired to completely break down the item into component parts (but see Section 13 pargraph 7) for thorough cleaning after a long period of neglect it will have to be removed from the car and, after completing the operations at paragraphs 4 - 11 above, refer to Fig.3.9 and remove the remaining items in any sequence but take careful note of the position of parts as incorrect assembly will result in complete failure of the carburettor.
13 Before reassembling, check all carburettor assembly screws and flange nuts for tightness but do not use undue force.
14 Always use a new gaskets and fibre washers on reassembly as failure to do so may result in leaks and will upset the calibration of the carburettor.
15 Reassembly of the carburettor is generally the opposite to the sequence used in dismantling.
16 Note that the nose of the pilot jet seats on the casting but it should not be screwed in with such force as may damage the seating.
17 Use only the correct washers when refitting the needle valves to the float chamber covers as the thickness of the washers partly determines the petrol level. Make a final check on the needle stem for free movement.

13 Carburettor (Solex) - cleaning and inspection

1 Absolute cleanliness during servicing is essential. Before stripping the carburettor, clean it outside to remove all trace of dirt, oil grease etc.
2 Do not use rag for drying or cleaning the inside of the carburettor or its component parts. A clean tray of petrol, a small stiff paint brush (no loose hairs) and compressed air for cleaning the parts is quite adequate.
3 Remove sediment in the float chamber by gentle brushing followed by swilling out with petrol.
4 The interior of the carburettor and exposed passages should be blown out to ensure that all loose particles of foreign matter are removed.
5 Use only compressed air for cleaning jets. Never use wire as a probe as the orifice may be enlarged and this will result in an increase in petrol consumption and a possible reduction in engine performance.
6 Inspect floats for leakage and dents. Leakage can be detected by immersing the float in warm water and watching for air bubbles escaping. Leaking or dented floats should be replaced. Never repair a float except in dire emergency as the volume and weight of the float is important.
7 Thoroughly clean the needle valves with petrol and blow out. Check for freedom of movement.
8 The accelerating pump is especially set at the factory, therefore the unit should not be needlessly dismantled. However, should the membrane require replacing it should be noted that this item is not usually supplied separately but forms part of an assembly.

14 Carburettors (Solex) - adjustment and synchronisation

1 Correct adjustment and synchronisation of the carburettors is possible only if cylinder compressions, valve clearances, ignition setting, spark plug gaps and the contact breaker gap are within the limits given in the appropriate Chapters of this Manual.
2 Having ensured that the criteria of paragraph 1 are met, run the engine until it attains its normal running temperature.
3 Each carburettor has two external adjustments, the slow running adjustment screw (Z) Fig.3.11 and the mixture volume control screw (W).
4 Switch off the engine when running temperature is obtained and loosen the clamping bolt (B) Fig.3.11 on the flexible link between the carburettors. Ensure that the mixture control lever in the car is at "RUN", disconnect the mixture control levers at the carburettors and make sure that they are fully forward. Now starting with the front adjust each carburettor separately.
5 Unscrew the screw (Z) and ensure that the throttle is closed by pressing on the slow running screw. Place a piece of thin paper (or a 0.002" feeler gauge) between the screw and the casting stop and screw down until the paper is lightly nipped. Remove the paper and screw in on (Z) one further complete turn from that point.
6 Gently screw the volume control screw (W) clockwise until light contact is made with the casting seat, then unscrew three quarters of a turn.
7 Repeat the above adjustments To the rear carburettor.
8 Start the engine and have an assistant to watch the revolution counter. Adjust each slow running screw (Z) equally until the engine is running at 650 rpm. Now screw out each volume control screw (W) a quarter of a turn at a time working alternately between carburettors until a drop in rpm is registered.
9 Carefully and alternately, screw in each volume control screw by quarter turns until the engine reaches its highest and steadiest idling speed. Take care not to go beyond this point where erratic running will be evident due to weakness of the mixture.
10 If the engine speed is now other than 650 rpm adjust the slow running adjustment screws (Z) alternately each a part turn at a time to obtain the required idling speed and to maintain synchronisation.

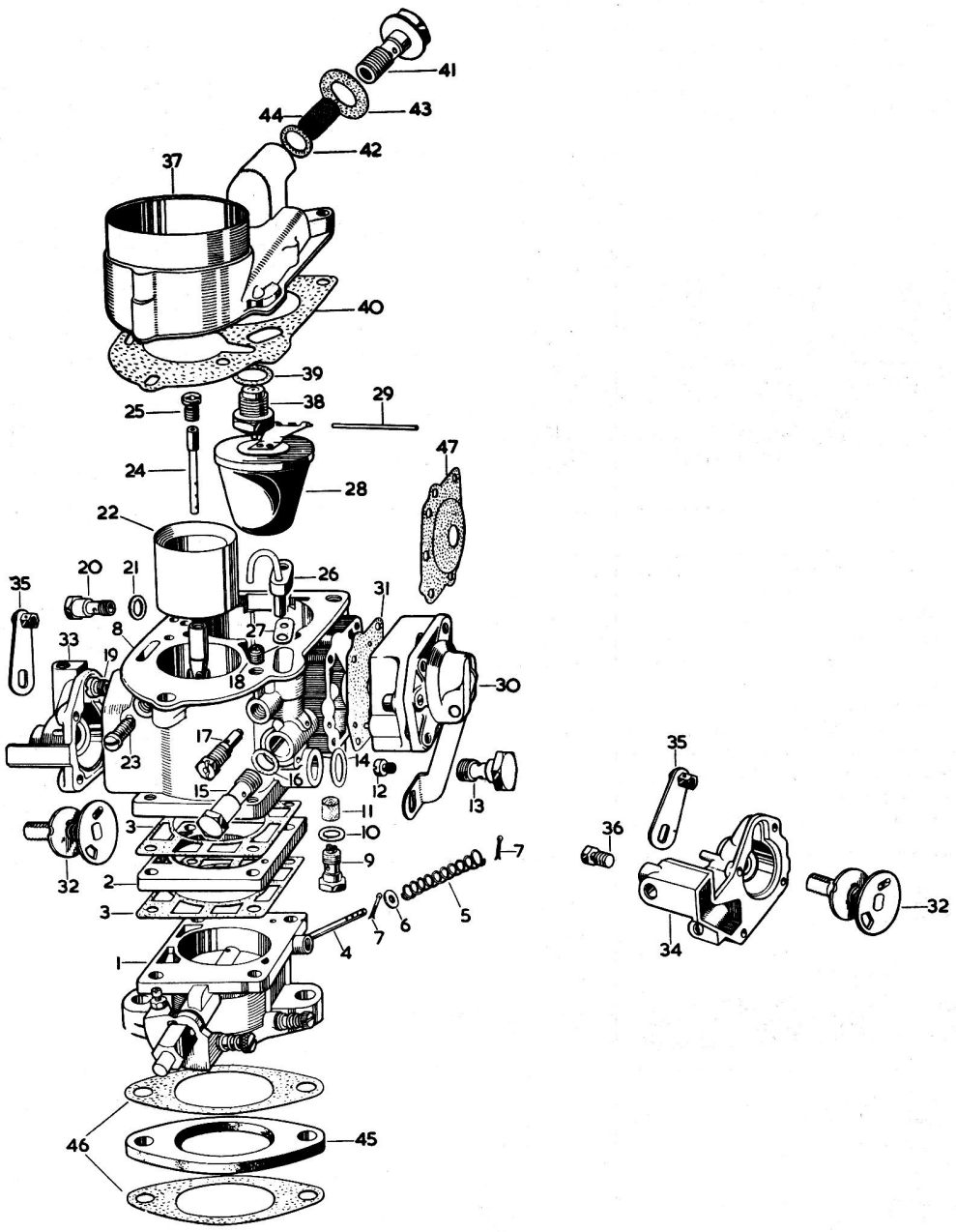

FIG.3.9. EXPLODED VIEW OF THE SOLEX CARBURETTOR

1 Throttle chamber
2 Nylon insulating washer
3 Gasket
4 Control rod
5 Spring
6 Washer
7 Split pin
8 Float chamber
9 Non-return valve
10 Washer
11 Filter
12 Bolt
13 Main jet
14 Washer
15 Pump jet
16 Washer
17 Pilot jet
18 Air bleed
19 Starter air jet
20 Starter petrol jet
21 Washer
22 Choke tube
23 Screw
24 Emulsion tube
25 Air correction jet
26 Accelerator pump injector
27 Gasket
28 Float
29 Float spindle
30 Accelerator pump
31 Gasket
32 Starter valve
33 Starter valve body (front carburettor)
34 Starter valve body (rear carburettor)
35 Starter valve lever
36 Bolt
37 Float chamber cover
38 Needle valve
39 Washer
40 Gasket
41 Banjo bolt
42 Washer - small
43 Washer - large
44 Filter
45 Insulating washer
46 Gasket
47 Diaphragm

11 The throttle connecting linkage between the carburettors should now be tightened care being taken during this work to ensure that both throttles are against their stops.
12 Ensure that the mixture control lever in the car is at "RUN" and that the mixture control levers at the carburettors are fully forward. Reconnect the mixture control cable.

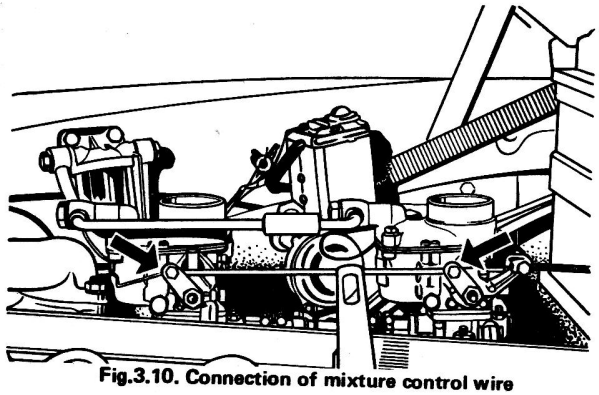

Fig.3.10. Connection of mixture control wire

15 Carburettor (Solex) - sudden break in performance

This could be due to tiny particles of foreign matter or water passing the filters in the carburettors and the fuel pump, and blocking one or more of the petrol metering jets. The remedy is to clear the jets and clean the filters. If the petrol is badly contaminated with water, the petrol tank will have to be removed as described in Section 8 and swilled out into a clean container; the petrol can be reclaimed by straining through a chamois leather. Then clean out the petrol pipes and the glass filter bottle in the engine compartment, this filter will give an indication of the degree of contamination of the petrol.

16 Carburettors (Solex) - poor slow running

Sudden failure to idle smoothly may be due to one or both pilot jets becoming obstructed and failing to pass the quantity of petrol required by the engine. They should be removed and cleared by blowing through. When replacing the jets, screw them in securely but do not use undue force.

17 Carburettors (Solex) - heavy fuel consumption

If checks show that choke levers, ignition timing, carburettor tuning etc., are correct it is advised that the accelerator pump discharge injector tube (item 26 Fig.3.9) be checked for correct positioning. Check its position by placing a straight-edge across the lower face of the mounting block and measuring the gap between the end of the tube and the straight-edge as shown in Fig.3.12. The correct gap should be 0.020" to 0.040" (0.50 to 1.00 mm). If this dimension is not correct, a replacement assembly should be fitted as bending of the injector tube may loosen the tube in the mounting block. Ensure that the gasket is refitted under the base of the assembly and that the locating screw is tight.

18 Carburettors (Solex) - failure to respond to throttle opening

If the engine idles satisfactorily but suddenly fails to respond to throttle opening, the fault will probably lie in the main jets, these should be removed for cleaning. The main jets are assembled in holders the heads of which are clearly marked "Main Jet Holder" (refer to item "T" in Fig.3.11). Remove the jet holder and gripping the head between the jaws of a spanner the jet can be removed with a screwdriver and blown out. Removal of the jet holder will allow the float chamber to drain and this will assist in carrying away any impurities.

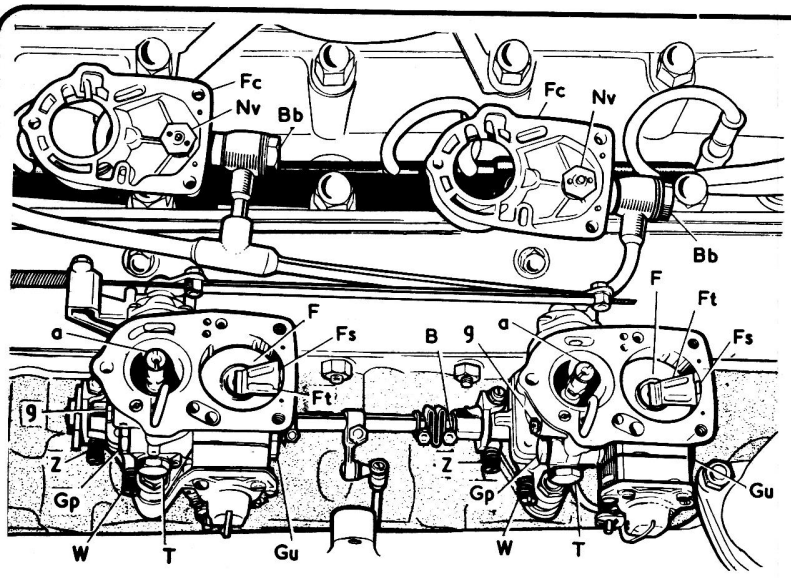

FIG.3.11. VIEW OF CARBURETTORS INSTALLED WITH FLOAT CHAMBER COVERS REMOVED

Bb Banjo bolt
Fc Float chamber cover
Nv Needle valve
F Float
Fs Float spindle
Ft Float toggle
g Pilot jet
Gp Pump jet
Gu Plug
T Main jet holder
a Air correction jet
B Clamping bolt
Z Slow running adjustment screw
W Volume control screw

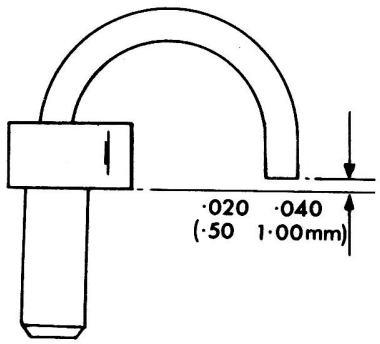

Fig.3.12. Checking the position of the injector tube

19 Carburettors (Solex) - flat spot (engine hot)

Should hesitation be noted when accelerating from slow to normal speeds, the pump jets may be partly or completely blocked and should be removed for cleaning. After replacing the jets and priming the carburettors, the pump action should be checked in the following manner:- remove the air cleaner pipe and open the throttle. A discharge should now occur from each pump injector visible in the choke tubes of the carburettors.

20 Carburettors (Solex) - difficult starting when engine cold

Provided the petrol supply is satisfactory and the battery is in good condition and a good spark is being obtained, the engine should start immediately. If it does not and there is no smell of petrol after the starter has been operated two or three times, the starter jets may need blowing out to clear obstructions.

21 Carburettors (Solex) - deterioration of performance

Do not be too ready to blame the carburettors for poor performance but after a long period of use some wear, as may affect performance,must be expected. Therefore, when the time arrives for a major overhaul of the engine serious consideration should be given to replacing the carburettors with manufacturer's reconditioned items in order to take full advantage of other work being put into the engine.

Note:- when refitting main, petrol and starter jets make certain that each fibre sealing washer is undamaged and that the jets are securely tightened.

22 Carburettors SU type HD 6 and HS 6 - general description

1 The 3.4 and 3.8 litre and the 340 models are fitted with twin SU type HD 6 carburettors whilst the 240 model has twin SU HS 6 carburettors, these are illustrated in Figs.3.13 and 3.14. They are generally similar in appearance and operation the main difference in contruction being that in the case of the HD 6 the jet is fixed and the mixture is controlled by an external screw and lever (item B in Fig.3.28) whilst in the HS 6 type the position of the jet in relation to the needle can be adjusted by means of an adjusting nut at the base of the carburettor and this movement of the jet controls the mixture.

2 These variable choke carburettors differ from most other makes 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.

3 Air passing rapidly through the carburettor draws petrol from the jet so forming the petrol/air mixture. The amount of petrol drawn from the jet depends on the position of the tapered carburettor needle, which moves up and down the jet orifice according to the engine load and throttle opening, thus effectively altering the size of the jet so that exactly the right amount of petrol is metered for the prevailing conditions.

4 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.

5 With the throttle fully open, the full effect of inlet manifold vacuum is felt by the piston which has an air bleed into the choke tube on the outside of the throttle. This causes the needle to rise fully bringing the needle with it. With the accelerator partly closed only slight inlet manifold vacuum is felt by the piston (although of course, on the engine side of the throttle the vacuum is greater), and the piston only rises a little, blocking most of the jet orifice with the metering needle.

6 To prevent the piston fluttering and giving a richer mixture when the accelerator pedal is suddenly depressed, an oil damper and a light spring are fitted inside the dashpot.

7 The only part of the piston assembly to come into contact with the piston chamber or dashpot is the actual piston rod. All other parts of the piston assembly, including the lower choke portion, have sufficient clearance to prevent metal to metal contact which is essential if the carburettor is to function correctly.

8 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, by means of a lever resting on top of it, closes a needle valve in the cover of the float chamber and this cuts off the supply of fuel from the tank. As fuel is used in the carburettor, the float drops and in so doing the float needle is unseated and allows more fuel to enter the float chamber.

9 The HD 6 carburettors employ a separate starting carburettor. But with the HS 6 model the rich mixture for starting is obtained by manually pulling down the jet to a smaller diameter of the needle.

23 Carburettor (SU) - removal and replacement

1 Disconnect the battery (for HD 6 carburettors) as a safety measure.

2 Undo the butterfly nut to the centre bolt of the air cleaner and lift out the air cleaner.

3 Undo the two bolts securing the air intake pipe to the carburettors and remove the pipe.

4 Disconnect the lead from the auxiliary starting carburettor to the thermostatic switch on the inlet manifold (HD 6 carburettors only).

5 Disconnect the auxiliary starting carburettor to manifold connection (HD 6 carburettors only).

6 Remove the split pin, plain and spring washers from the connecting link pivot located on the manifold between the front and rear carburettors and disconnect the throttle link rod joint from the ball pin on the bell crank lever.

7 Disconnect the choke cable and the throttle linkage from the pivot pin between the carburettors (HS 6 carburettors only).

8 If automatic transmission is fitted, remove the spring clip which secures the kick down rod to the front carburettor.

9 Disconnect the distributor vacuum pipe from the front carburettor.

10 Disconnect the accelerator return spring if fitted to the particular model.

11 Remove the clip which attaches the float chamber overflow pipes to the oil filter.

12 Remove the nuts and washers securing each carburettor to the inlet manifold.

13 Remove the carburettors together with the insulating distance pieces.

14 Refitting is the reverse of the removal procedure,but particular attention must be paid to the throttle linkage setting of the carburettors.

15 The following paragraphs 16 - 20 inclusive refer to the HD 6 carburettor.

16 With the front carburettor coupling and the rear carburettor throttle lever released, check that both butterflies are fully closed and that the rear carburettor coupling is clearing the manifold nut.

17 With both carburettors fully closed, retighten the front coupling.

18 Refer to Fig.3.15. Unscrew the intermediate throttle stop and push down on the bell crank lever until centre "A" is 1/16" (1.6 mm) below a line from centre "B" to the pivot centre. When in this position, screw down the stop on to the intermediate throttle and lock in this position.

19 Lock the lever to carburettor spindle.

20 Ensure that when the throttle is closed, the intermediate lever does not foul the petrol connection.

21 Open the throttle fully and check that both carburettors are in the fully open position.

22 The following paragraphs 23 - 26 inclusive, refer to the HS 6 carburettor.

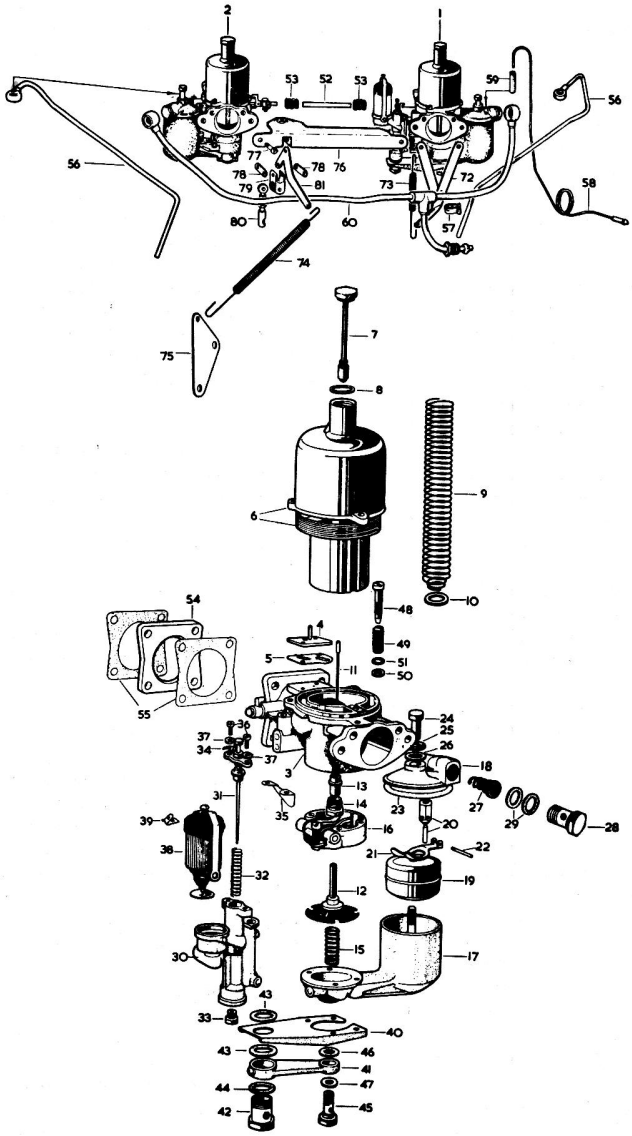

FIG.3.13. THE S.U. HD.6 CARBURETTOR (FRONT)

1 *Front carburettor*
2 *Rear carburettor*
3 *Carburettor body*
4 *Ignition union adaptor*
5 *Gasket*
6 *Suction chamber and piston*
7 *Damper*
8 *Washer*
9 *Spring*
10 *Skid washer*
11 *Jet needle*
12 *Jet*
13 *Jet bearing*
14 *Nut - jet bearing*
15 *Spring*
16 *Jet unit housing*
17 *Float chamber*
18 *Float chamber cover*
19 *Float*
20 *Float needle and seat*
21 *Float needle lever*
22 *Knurled pin*
23 *Gasket*
24 *Cap nut*
25 *Fibre serrated washer*
26 *Aluminium washer*
27 *Filter*
28 *Banjo bolt*
29 *Fibre washer*
30 *Auxiliary starting carburettor body*
31 *Auxiliary starting carburettor needle*
32 *Spring*
33 *Jet*
34 *Spring clip*
35 *Dust shield*
36 *Screw*
37 *Double coil spring washer*
38 *Solenoid*
39 *Spring clip*
40 *Bracket*
41 *Connecting arm*
42 *Banjo bolt*
43 *Fibre washer*
44 *Fibre washer*
45 *Banjo bolt*
46 *Fibre washer*
47 *Aluminium washer*
48 *Slow running control valve*
49 *Spring*
50 *Neoprene washer*
51 *Brass washer*
52 *Connecting rod*
53 *Connecting rod coupling*
54 *Manifold insulator*
55 *Gasket*
56 *Overflow pipe*
57 *Overflow pipe clip*
58 *Distributor vacuum suction pipe*
59 *Neoprene coupling tube*
60 *Petrol feed pipe*
72 *Front carburettor spring bracket*
73 *Front carburettor throttle spring*
74 *Throttle return spring*
75 *Return spring bracket*
76 *Throttle stop bracket*
77 *Dowel bolt*
78 *Link*
79 *Trunnion*
80 *Link rod*
81 *Throttle lever*

23 Set the throttle interconnecting clamping levers (item 7 in Fig.3.16) so that the link pin is 0.006" (0.15 mm) away from the lower edge of the fork as shown in the inset. Tighten the clamp bolts.
24 With the jet levers at their lowest position, set the jet interconnecting lever clamp bolts (item 8 in Fig.3.16) so that both jets commence to move simultaneously.
25 Reconnect the mixture control wire, with about 1/16" (1.6 mm) free movement, when the control lever in the car is set at "RUN", before it starts to move the jet levers.
26 Operate the mixture control lever in the car until the linkage is about to move the carburettor jets and then adjust the fast idle screws to give an engine speed of about 1000 rpm when hot.

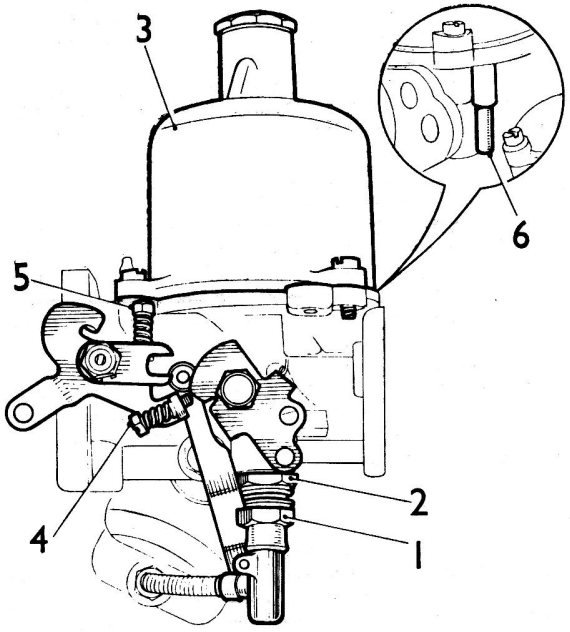

FIG.3.14. THE S.U. HS CARBURETTOR

1 Jet adjusting nut
2 Jet locking nut
3 Piston/suction chamber
4 Fast idle adjusting screw
5 Throttle adjusting screw
6 Piston lifting pin

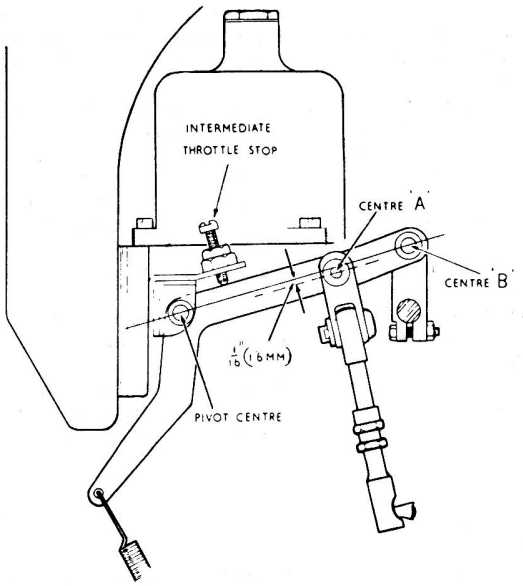

Fig.3.15. Throttle control linkage setting HD6 carburettor

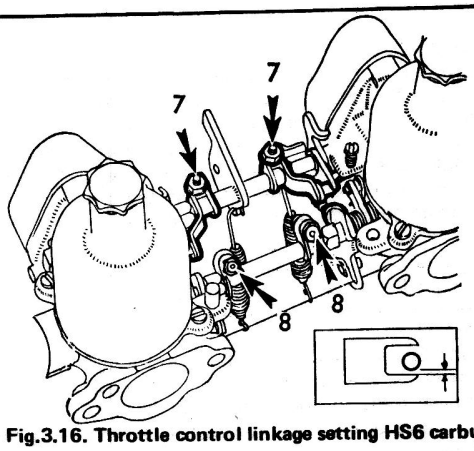

Fig.3.16. Throttle control linkage setting HS6 carburettor

24 Carburettor HD 6 - dismantling and reassembly

1 Remove the starting carburettor from the carburettor by undoing the banjo bolt (item 42 in Fig.3.13). From this point onwards both front and rear carburettors can be treated in a similar manner.
2 Unscrew the damper and remove it together with its washer.
3 Using a small file or scriber, scratch identification marks on the suction chambers so that they may be fitted together again in their original position.
4 Remove the three suction chamber retaining screws and remove the suction chamber from the body leaving the piston in position. Be careful when lifting off the suction chamber not to apply side loads to the piston otherwise the piston needle may be bent.
5 Lift the piston spring from the piston noting which way round it is fitted.
6 Remove the piston and invert it to allow the oil in the damper bore to drain out. Place the piston in a safe place so that the needle will not be damaged or that the piston roll onto the floor. It is suggested that the piston be placed on the neck of suitable sized jar with the needle inside, so acting as a stand.
7 It is recommended that, unless absolutely necessary, the needle is not separated from the piston. However, if the needle must be removed, slacken the retaining screw in the side of the piston body and remove the needle.
8 Mark the position of the float chamber lid in relation to the body. Undo the cap nut and remove together with the washer. Lift off the float chamber lid.
9 Withdraw the pin from the float chamber lever and remove the lever. The pin is serrated and can be removed in one direction only.
10 Remove the float needle by unscrewing on the brass valve body, use the correct size spanner.
11 The float may be lifted out of the float chamber. Place it in a position where it will not be damaged.
12 Remove the banjo bolt from the base of the front carburettor, this will release the connecting arm for the starting carburettor. Note the fibre and aluminium washers.
13 Remove the four setscrews securing the float chamber to the body. On the front carburettor, these screws also secure the starting carburettor bracket.
14 Separate the float chamber from the body and this will free the jet spring, the jet and diaphragm and the jet housing which may now be lifted away from the body.
15 Unscrew the jet bearing nut and lift out the jet bearing.
16 Unscrew the slow running control valve from the body and collect its neaprene and brass washers, note their positions for reassembly.
17 No further dismantling of the carburettor is necessary, indeed, it is rarely that dismantling beyond paragraph 11 will ever be required.
18 Reassembly is the reverse of the above. Fit new washers throughout. The jet needle must be reassembled in the piston in the manner described in Section 33. The jet must be centred as

described in Section .
19 Finally, and before fitting the suction chamber fill the piston damper bore to within ½" of its top with SAE 20 engine oil. Wipe any spillage off the outside of the piston. After fitting the suction chamber, raise the piston by means of the lifting pin and check that it falls back smartly on to the upper face of the body. Any sluggishness, assuming all other factors to be correct, will probably be due to oil on the outside of the piston.

25 Carburettor HS 6 - dismantling and reassembly

1 Refer to Fig.3.17.
2 Remove the baffle plate from the inlet nozzle on those carburettors fitted with "push-on" type petrol feed pipe.
3 Thoroughly clean the outside of the carburettor.
4 Mark the relative positions of the suction chamber and the carburettor body.
5 Remove the damper and its washer.
6 Unscrew the three suction chamber retaining screws and lift off the chamber vertically so as not to put any side loads on the piston as may bend the needle.
7 Refer to Fig.3.18.
8 Remove the piston spring and washer (if fitted). Note which way round the spring is fitted.
9 Carefully remove the piston and invert it to allow the oil in the damper bore to drain out. Place the piston in a safe place so that the needle will not be damaged or that the piston will roll onto the floor. It is suggested that the piston be placed on the neck of a suitably sized jar with the needle inside, so acting as a stand.
10 It is recommended that, unless absolutely necessary, the needle is not removed from the piston. However, if the needle must be removed, slacken the retaining screw on the side of the piston and remove the needle. If the needle cannot easily be removed, tap the needle inwards first and then pull outwards. Do not bend the needle.
11 If a piston lifting pin with an external spring is fitted, remove the spring retaining circlip and spring, then push the lifting pin upwards to remove it from its guide. With the concealed spring type, press the pin upwards, detach the circlip from its upper end, and withdraw the pin and spring downwards.
12 Refer to Fig.3.19.
13 Support the moulded base of the jet and slacken the screw retaining the jet pick-up link.
14 Relieve the tension of the pick-up lever spring from the screw and remove the screw and brass bush (when fitted).
15 Unscrew the brass sleeve nut retaining the flexible jet tube to the float chamber and withdraw the jet assembly from the carburettor body. Note the gland, washer and ferrule at the end of the jet tube.
16 Remove the jet adjusting nut and screw. Unscrew the jet locking nut and detach the nut and jet bearing. Withdraw the bearing from the nut, noting the brass washer under the shoulder of the bearing.
17 Refer to Fig.3.20.
18 Note the location points of the two ends of the pick-up lever return spring. Unscrew the lever pivot bolt together with its double coil spring washer, or spacer. Detach the lever assembly and return spring.
19 Note the location of the two ends of the cam lever spring and push out the pivot bolt tubes, taking care not to lose the spring. Lift off the cam lever noting the skid washer between the two levers.
20 Refer to Fig.3.21.
21 Slacken and remove the bolt retaining the float chamber to the carburettor body. Note the component sequence with flexibly mounted chambers.
22 Mark the location of the float chamber lid. Remove the lid retaining screws and detach the lid and its gasket complete with the float assembly.
23 Push out the float hinge pin from the end opposite to its serrations and detach the float.
24 Extract the float needle from its seating and unscrew the seating from the lid using the correct sized spanner (a box spanner will be found to be the most suitable tool). Do not distort the seating.
25 Refer to Fig.3.32.
26 Close the throttle and mark the relative position of the throttle disc and the carburettor flange.
27 Unscrew the two disc retaining screws. Open the throttle and ease out the disc from its slot in the throttle spindle. The disc is oval and will jam if care is not taken.
28 Tap back the tabs of the tab washer securing the spindle nut. Note the location of the lever arm in relation to the spindle and carburettor body, remove the nut and detach the arm.
29 Reassembly is the reverse of the above. Fit new washers throughout. The jet needle must be assembled in the position in the manner described in Section 33. The jet must be centred as described in Section 32.
30 Finally, and before fitting the piston damper, top up the piston damper tube with SAE 20 oil until the level is ½" (12.7 mm) above the top of the piston rod.

26 Carburettor SU - examination and repair

The SU carburettor, generally speaking is most reliable and it is very rarely that you would have to completely dismantle it in the manner described in Section 24 and 25. However, after a long period of use some deterioration must be expected, therefore, when the time arrives for a major overhaul of the engine, serious consideration should be given to replacing the carburettors with factory reconditioned items. The carburettor may develop one or more of several faults which may not be readily apparent without careful examination. The common faults to which the carburettor is prone are:-
1 Piston sticking.
2 Float needle sticking.
3 Float chamber flooding.
4 Water and dirt in the carburettor.
In addition the following parts are susceptible to wear after high mileage and as they will affect fuel consumption they should be checked and rectified at, say every other 10,000 mile servicing .
a) The carburettor needle: if the carburettor has not been correctly assembled at some time so that the needle has not been truly central in the jet orifice it will be found that the needle will have a tiny ridge on it. If this is noted, the needle must be replaced with one of a similar type (identification letters are stamped on the flat of the needle). As the needles are made to very fine tolerances, no attempt should be made to clean out the ridge or to rub down the needle with emery cloth. If the needle requires cleaning this can be done by rubbing very lightly with metal polish.
b) The carburettor jet: If the needle is worn it is likely that the rim of the jet will be damaged where the needle has been striking it. It should be renewed as wear in the jet will result in high fuel consumption. The jet may also become worn or ridged on the outside where it has been sliding up and down between the jet bearing every time the choke is pulled out. Renewal is the only remedy.
c) The edges of the throttle and the choke tube may become worn. Renew as necessary.
d) The washers fitted to the base of the jet and under the float chamber lid may deteriorate and leak after long use and result in fuel leakage.
e) After high mileage the float chamber needle and seat may become ridged and if this occurs, flooding of the float chamber becomes a distinct possibility. Renew both the needle and the brass seating.

27 Carburettor SU - piston sticking

1 The hardened piston rod which slides in the centre guide tube of the suction chamber is the only part which should make

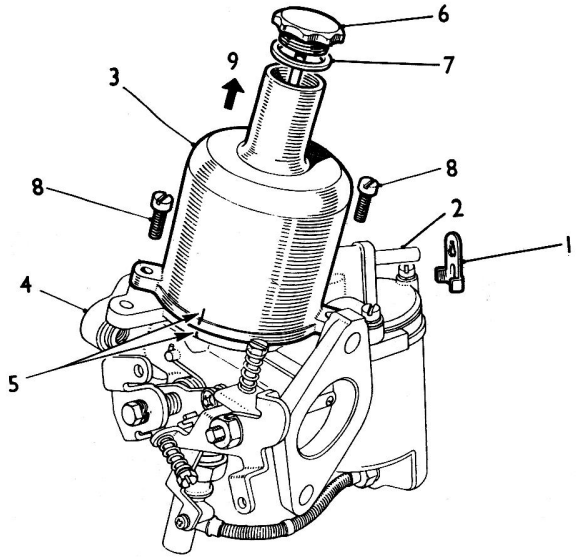

FIG. 3.17. DISMANTLING THE HS6 CARBURETTOR - STAGE 1

1 *Baffle plate*
2 *Inlet nozzle*
3 *Suction chamber*
4 *Carburettor body*
5 *Marks for replacement*
6 *Damper*
7 *Damper washer*
8 *Chamber retaining screws*
9 *Direction of removal*

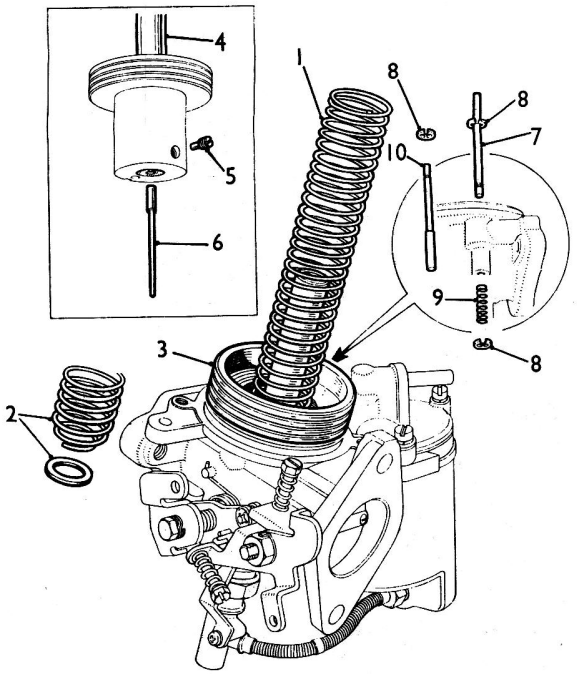

FIG. 3.18. DISMANTLING THE HS6 CARBURETTOR - STAGE 2

1 *Piston spring*
2 *Alternative spring with washer*
3 *Piston assembly*
4 *Piston rod*
5 *Needle locking screw*
6 *Needle*
7 *Piston lifting pin*
8 *Circlip for pin*
9 *Spring for pin*
10 *Alternative lifting pin*

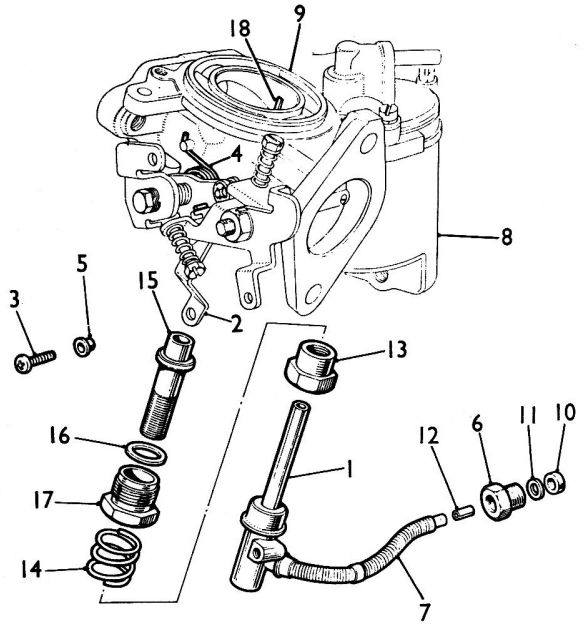

FIG. 3.19. DISMANTLING THE HS6 CARBURETTOR - STAGE 3

1 *Jet assembly*
2 *Pick-up link*
3 *Link retaining screw*
4 *Pick-up lever return spring*
5 *Brass bush*
6 *Sleeve nut*
7 *Flexible jet tube*
8 *Float chamber*
9 *Carburettor body*
10 *Gland*
11 *Washer*
12 *Ferrule*
13 *Jet adjusting nut*
14 *Spring for nut*
15 *Jet bearing*
16 *Brass washer*
17 *Jet locking nut*
18 *Piston key*

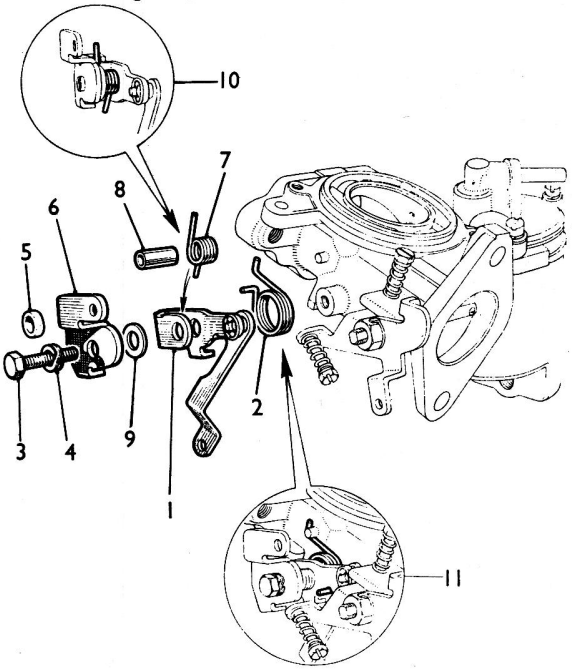

FIG. 3.20. DISMANTLING THE HS6 CARBURETTOR - STAGE 4

1 *Pick-up lever*
2 *Lever return spring*
3 *Lever pivot bolt*
4 *Double coil spring washer*
5 *Spacer (alternative)*
6 *Cam lever*
7 *Lever spring*
8 *Pivot bolt tube*
9 *Skid washer*
10 *Cam lever spring location*
11 *Pick-up lever spring location*

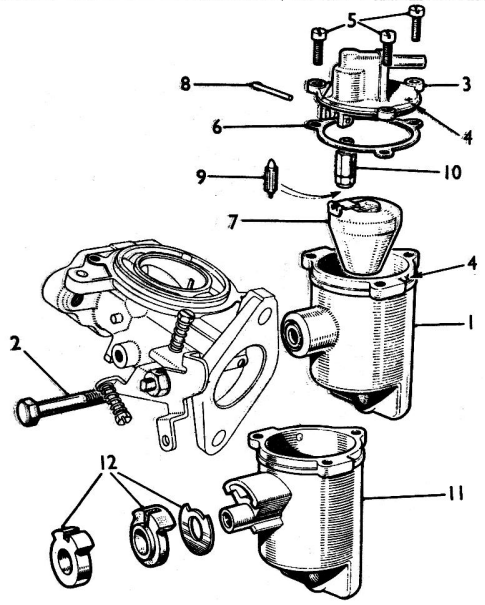

FIG. 3.21. DISMANTLING THE HS6 CARBURETTOR - STAGE 5

1 Float chamber
2 Retaining bolt
3 Float chamber lid
4 Marks for replacement
5 Lid retaining screws
6 Lid gasket
7 Float
8 Float hinge pin
9 Float needle
10 Needle seating
11 Alternative float chamber
12 Alternative spacers

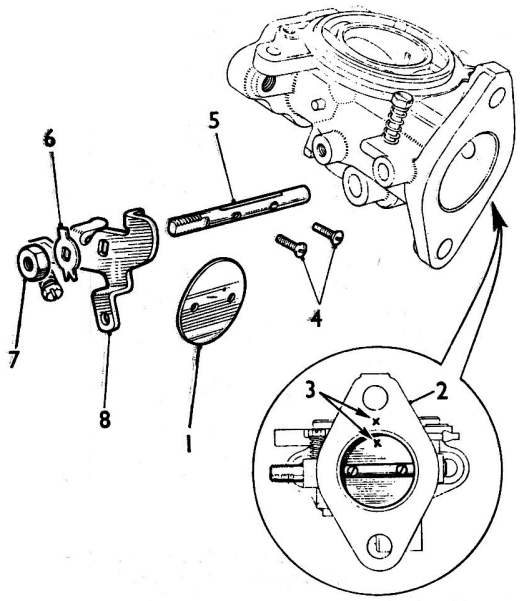

FIG. 3.22. DISMANTLING THE HS6 CARBURETTOR - STAGE 6

1 Throttle disc
2 Carburettor flange
3 Marks for replacement
4 Disc retaining screws
5 Throttle spindle
6 Tab washer
7 Spindle nut
8 Lever arm

contact with the suction chamber.

2 Corrosion of the piston rod is not uncommon and this will prevent free movement of the piston. The corrosion can be cleared by careful rubbing with metal polish or, in extreme cases, by very light rubbing with 00 crocus paper.

3 Check that the rim of the piston is not burred as the result of a knock or having been dropped. Burrs can be removed by rubbing with fine emery cloth.

4 After high mileage wear in the centre guide tube may allow the piston to touch the wall of the suction chamber and this will cause obstruction to free movement of the piston.

5 Great care should be taken to remove only the minimum amount of metal when freeing the piston as the parts are made to very fine tolerances and too large a gap will cause air leakage and ill upset the function of the carburettor. Clean down the walls of the suction chamber and the piston rim and ensure there is no oil on them. A trace of light oil may be applied to the piston rod.

6 If the piston is sticking, under no circumstances try to clean it by stretching the return spring.

28 Carburettor SU - float needle sticking

1 If the float needle sticks, the carburettor will soon run dry and the engine will stop.

The easiest way to check for a sticking needle is to disconnect the fuel inlet pipe to the carburettor, check that the gear lever is in "neutral" or, for automatic transmission that it is in "N" or "P", guide the fuel pipe into a wad of rag or into a container, and press the starter solenoid button. If fuel is passed, the fault is almost certainly a sticking needle.

2 Remove the float chamber lid, dismantle the needle valve and clean the housing and float chamber thoroughly.

29 Carburettor SU - float chamber flooding

If fuel emerges from the small breather hole in the cover of the float chamber this is known as flooding. It can be caused by the float chamber needle not seating properly in its housing and this is usually due to a piece of dirt or foreign matter which has passed the filters and has become jammed between the needle and its seating in the housing. Alternatively the float may have developed a leak so that it is not rising to operate the float needle lever, this fault can be determined by removing the float and shaking it, any sound of liquid inside the float indicates that it is faulty.

It may be that the setting of the float needle lever in relation to the float chamber cover, is incorrect. Refer to Fig 3.23 in the case of the HD 6 carburettor. The lever clearance should be as shown (use the shank of a 7/16" drill as the test bar) when the lever is lightly pressed on to the needle. If adjustment is required, hold the flat portion with a pair of pliers and bend only at the positionshown. In the case of HS 6 carburettors refer to Fig.3.24. The clearance indicated by the arrow should be 1/8" to 3/16" (3.2 to 4.8 mm) when the needle valve is held in the shut-off position by the weight of the float only. The clearance is adjusted by bending at the crank.

30 Carburettor SU - water or dirt in the carburettor

1 Because of the size of the jet orifice,water or dirt in the carburettor is usually self clearing with only a momentary noticeable affect on the engine performance. However, if dirt in the carburettor is suspected, lift the piston and flood the float chamber. The normal level of the fuel should be about 1/16" below the top of the jet so that on flooding the carburettor the fuel should flow out of the jet hole.

2 If little or no petrol appears, start the engine (because of the needle, the jet will never be completely blocked) and with the throttle fully open place your hand over the air intake, leave in position momentarily and then remove it. The vacuum caused by this action will help suck out any foreign matter, repeat this procedure two or three times and then check for flow of fuel as described in the first paragraph of this Section.

3 In the event of the above action failing to clear the jet (and this is unlikely) you will have to remove and blow out the jet.

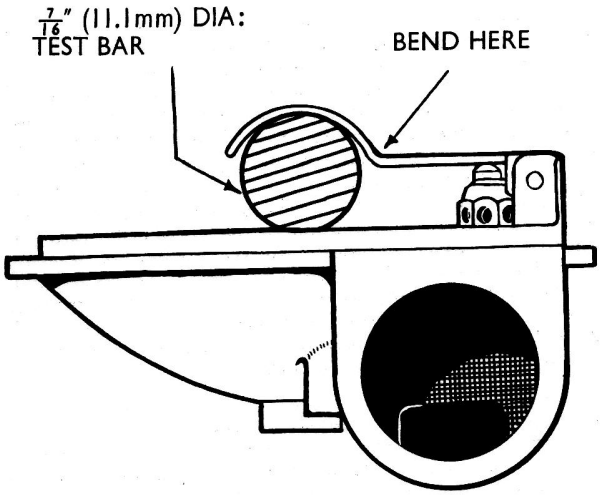

Fig.3.23. Checking the float lever setting HD6 carburettor

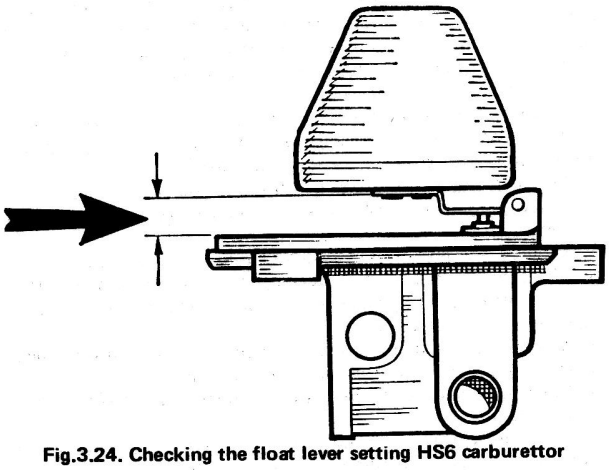

Fig.3.24. Checking the float lever setting HS6 carburettor

31 Carburettor HD 6 - jet centring

Warning: Take care not to bend the needle when carrying out this operation.

1 Remove the carburettor from the engine as described in Section 23.
2 Remove the piston damper.
3 Remove the four setscrews securing the float chamber to the carburettor body, detach the float chamber and remove the jet housing and the jet.
4 Using a ring spanner, slacken the jet locking nut approximately half a turn.
5 Refer to Fig.3.15. Replace the jet and diaphragm assembly. Push the jet and diaphragm assembly as high as possible with hand pressure and at the same time press the piston down onto the jet bridge, using a pencil or a piece of rod for this. Centralisation will be helped by lightly tapping on the side of the carburettor body.
6 Tighten the jet locking nut.
7 The actual centring must be carried out with the setscrew holes in the jet diaphragm and carburettor in alignment. After tightening the jet locking nut the jet diaphragm must be kept in the same position relative to the carburettor body and to do this it is advisable to mark one of the corresponding jet diaphragm and carburettor setscrew holes with a soft pencil. Centring will be upset if the diaphragm is moved radially after tightening the jet nut.
8 The jet is correctly centred when the piston falls freely and hits the jet "bridge" with a metallic click. Check if there is any difference in the sound of the piston hitting the bridge with the jet in its highest and lowest positions. If there is any difference in the sound, the procedure for centralising the jet will have to be repeated.
9 If difficulty in centring the jet is encountered after carrying out above procedure, it is permissable to lower the jet needle slightly in the position to make centralising more positive. The needle must, however, be restored to its normal position when checking the centralisation.
10 Top up the damper with SAE 20 engine oil.

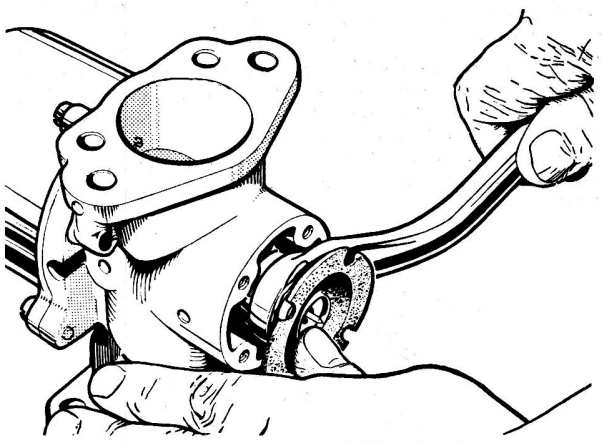

Fig.3.25. Centring the jet HD6 carburettor

32 Carburettor HS 6 - jet centring

Warning: Take care not to bend the needle when carrying out this operation.

1 Remove the carburettor from the engine as described in Section 23.
2 Remove the piston damper.
3 Remove the jet head screw to release the control linkage.
4 Refer to Fig.3.26. Withdraw the jet, disconnecting the fuel feed pipe union in the float chamber and removing the rubber sealing washer.
5 Remove the jet locking spring and adjusting nut.
6 Replace the jet and insert the fuel feed pipe connections into the float chamber.
7 Slacken the jet locking nut until the assembly is free to rotate.
8 Apply pressure to the top of the piston rod using a pencil or a piece of rod.
9 Tighten the jet locking nut at the same time keeping the jet hard up against the jet bearing.
10 The jet is correctly centred when the piston falls freely and hits the jet bridge with a metallic click. Check if there is any difference in the sound of the piston hitting the bridge with the jet in its highest and lowest position. If there is any difference in the sound the procedure for centralising the jet will have to be repeated.
11 If difficulty in centring the jet is encountered, it is permissible to lower the needle slightly in the piston to centralisation. The needle must be restored to its normal position for checking the centralisation.
12 Refit the jet locking spring when centralisation is correct. Before replacing the fuel feed pipe line into the float chamber fit the rubber sealing washer over the end of the plastic pipe so that at least 3/16" (4.8 mm) of pipe protrudes (see inset, Fig.3.26).
13 Top up the damper with SAE 20 engine oil.

33 Carburettor SU - needle replacement

The needle size is determined during engine development and

will provide the correct mixture strength unless extremes of temperature, humidity or altitude are encountered. A different needle to that specified may be required if any alteration to the standard specification of the exhaust system, air cleaner, camshaft or compression ratio is made.

1 Remove the suction chamber and piston assembly.

2 Slacken the needle clamping screw in the side of the body of the piston and pull out the old needle. If the needle is tight it can probably be loosened by moving it inwards and then pulling out.

3 The needle type letter is stamped on the shank of the needle, check that this corresponds with the item being fitted.

4 Fit the needle to the piston assembly so that it is positioned as shown in Fig.3.27. Another type of needle, not illustrated, has a groove instead of the shoulder depicted, the correct position for this type of needle is for the bottom edge of the groove to be level with the bottom edge of the piston rod.

5 Correct positioning of the needle in relation to the piston is essential otherwise the fuel/air mixture to the engine will be upset.

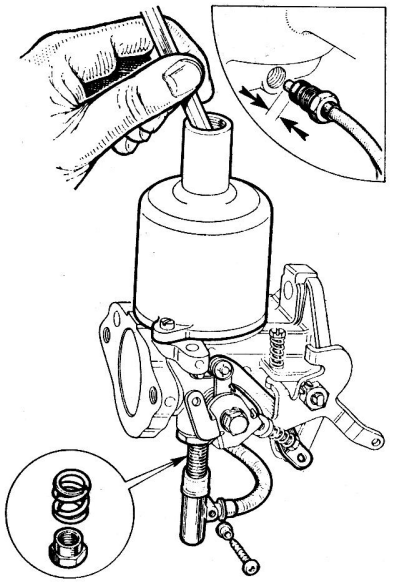

Fig.3.26. Centring the jet HS6 carburettor

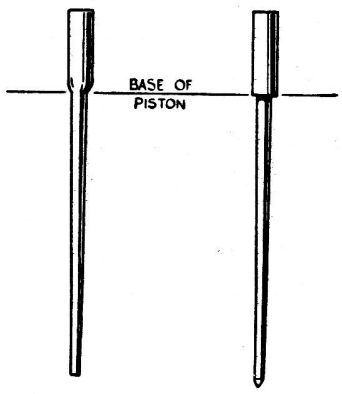

Fig.3.27. Location of the jet needle in the piston

34 Carburettors SU - adjustment and tuning - general

It is useless to attempt carburettor tuning until the cylinder compressions, valve clearances, spark plug gaps and contact breaker gaps have been tested, checked and adjusted as necessary. The distributor centrifugal advance mechanism and vacuum advance operation should be checked and ignition timing set to the correct figure. The ignition timing is important since if retarded or advanced too far the setting of the carburettors will be affected. Ensure that the needles are correctly located in the pistons (see Section 33). Check over the carburettors and ensure that the pistons are free in the suction chambers and that the piston dampers are topped up with engine oil SAE 20. Lubricate the throttle controls and check for free operation and travel. Check that petrol filters are clean.

35 Carburettors SU HD 6 - adjustment and tuning

Only two adjustments are provided at the carburettor as illustrated in Fig.3.28. These are (a) the slow running volume screw "A" and (b) the mixture adjusting screws "B" governing the idling speed and the mixture strength respectively. The design of the SU carburettor is such that correct mixture strength at idling speed ensures that the carburettors are correctly adjusted throughout their entire range.

1 Remove the air cleaner and air intake pipe .

2 Remove the suction chambers from the carburettors and screw out both mixture screws (B) until the tops of the jets are flush with the jet bridge in each carburettor body.

3 Screw in the mixture screws until the jets start to move and then screw in a further 3½ turns. Replace the pistons and suction chambers.

4 Slacken one clamp bolt on the coupling between the throttle spindles. Check that both butterfly valves are closed by rotating both throttle spindles clockwise when viewed from the front. Tighten the coupling clamp bolt.

5 Screw in the slot running volume screws (A) until they meet their seatings and then unscrew each of the screws 2½ turns.

6 Start the engine and run until it reaches its normal operating temperature.

7 Now the carburettors must be balanced (synchronised) by adjusting on the slow running volume screws (A) until they are sucking equally. This can best be judged by applying a balance meter to the carburettor air inlet and adjusting on the screws until the readings are the same. Alternatively, listen to the "hiss" of each carburettor (use a piece of tube as illustrated in Fig.3.29, a piece of old bicycle tube is ideal and adjust on each of the screws (A) until it is judged that the hiss from each carburettor is the same.

8 Keep checking as above and continue adjusting on the slow running volume screws until, with the carburettors balanced (same hiss), the engine is idling at 500 rpm on cars fitted with the 3-speed synchromesh gearbox or automatic transmission and at 700 rpm on cars fitted with the all synchromesh gearbox.

9 Re-check that both butterfly valves are fully closed by rotating the throttle spindles in a clockwise direction looking from the front, and noting if any change in engine speed results, there should be no change in engine speed if the butterflies are indeed closed.

10 Now refer to Fig.3.30 and check the mixture strength by lifting the piston of the front carburettor approximately 1/32" (0.8 mm) by means of the lifting pin (arrowed), if:-

a) the engine speed increases appreciably this indicates that the mixture strength of the front carburettor is too rich.

b) the engine speed immediately decreases, this indicates that the mixture strength of the front carburettor is too weak.

c) the engine speed increases slightly and continues to run without change of speed, then the mixture strength of the front carburettor is correct.

11 Repeat the above operation for the rear carburettor to test its mixture strength and after adjustment recheck the front carburettor as the two carburettors are interdependant.

12 A check on the correctness of the mixture adjustment is to listen to the exhaust note:-
a) an irregular note, splashy misfire and colourless emission indicates that the mixture is too weak.
b) a regular or rhythmical misfire and the emission of black smoke indicates that the mixture is too rich.
c) a regular and even note indicates that the mixture is correct.
13 To enrich the mixture, screw in the adjustment screw (B) clockwise and to weaken the mixture, unscrew it anti-clockwise.
14 Some adjustment of the slow running to maintain the desired 500 or 700 rpm may now be required following adjustment of the mixture strength. To do this, rotate each screw (A) exactly the same amount and listen at the air intake (or apply the meter) to maintain balance.
15 Replace the air cleaner and air intake pipe.
16 Re-check the mixture strength as described in paragraph 10.

36 Carburettors SU HS 6 - adjustment and tuning

1 Remove the air cleaner and the air intake elbow.
2 Remove the suction chamber and piston from each carburettor.
3 Disconnect the mixture control wire.
4 Screw the jet adjusting nut upwards until the jet is flush with the bridge of the carburettor or fully up if this position cannot be obtained but the position of both jets must be the same.
5 Replace the piston and suction chamber. Check that the piston falls freely onto the bridge when the lifting pin is released.
6 Turn down the jet adjusting nut two complete turns.
7 Unscrew the throttle adjusting screws ("A" in Fig.3.31) until they are just clear of their stops and then screw down 1½ turns open.

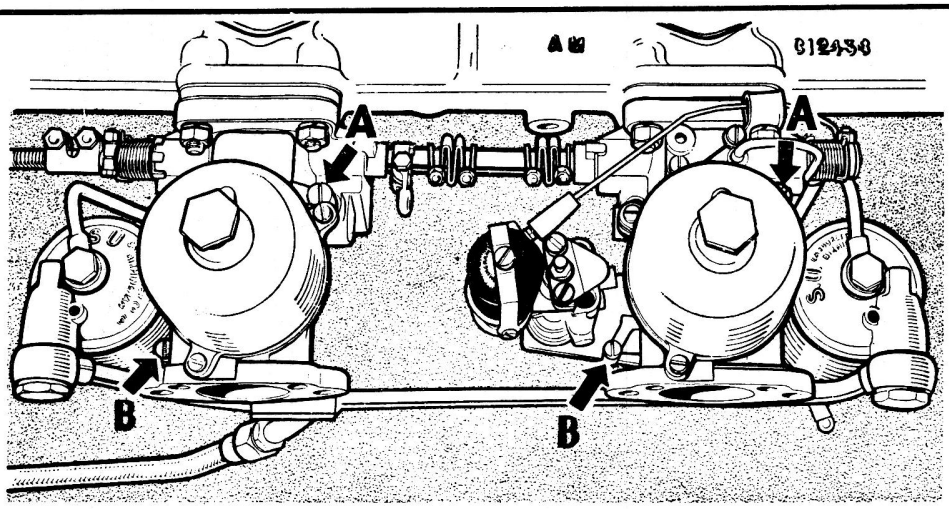

Fig.3.28. HD6 carburettor adjustment

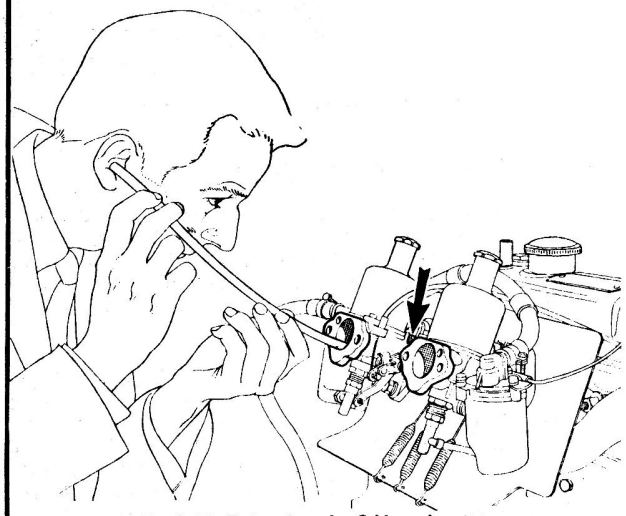
Fig.3.29. Balancing the S.U. carburettor

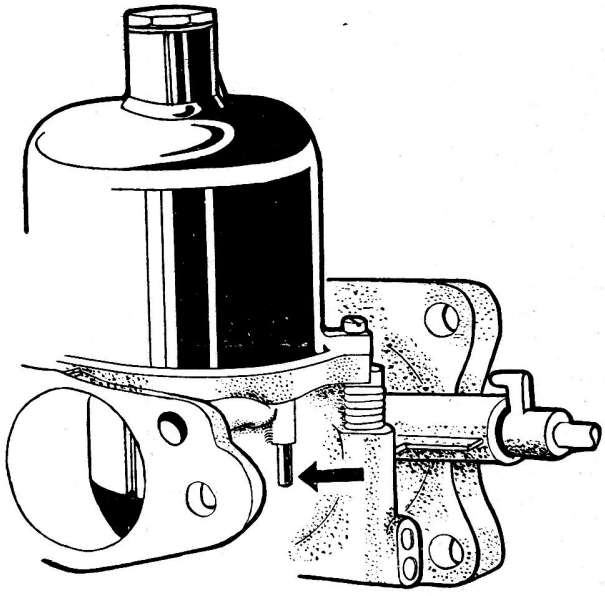
Fig.3.30. The piston lifting pin

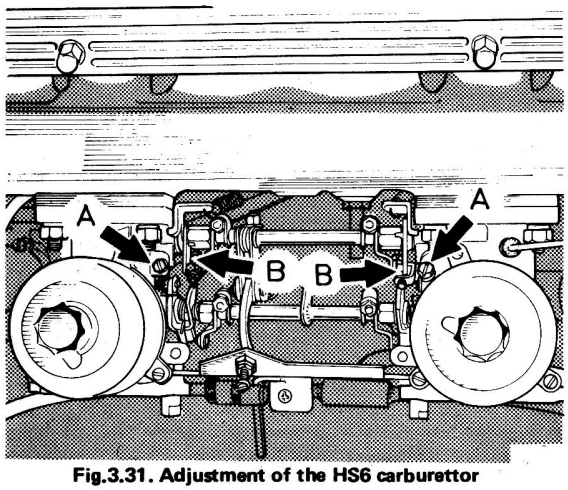

Fig.3.31. Adjustment of the HS6 carburettor

8 Slacken both of the clamping bolts on the throttle spindle interconnections.
9 Disconnect the jet control interconnection by slackening the clamping bolts.
10 Unscrew the fast idle adjusting screws until they are clear of their stops.
11 Start the engine and run until it attains its normal operating temperature.
12 Adjust on each throttle adjusting screw by the same amount each to give the desired idling speed.
13 Now the carburettors must be balanced (synchronised) by adjusting the throttle adjusting screws until they are sucking equally. This can best be judged by applying a balance meter to the carburettor air inlet and adjusting the screws until the readings are the same. Alternatively, listen to the "hiss" of each carburettor (use a piece of tube as illustrated in Fig.3.29, a piece of old bicycle tube is ideal) and adjust on each of the screws until it is judged that the hiss from each carburettor is the same.
14 Check the mixture strength of the front carburettor (see Fig.3.30) by raising the piston about 1/32" by means of the lifting pin, if:-
a) the engine speed increases appreciably, this indicates that the mixture of the front carburettor is too rich.
b) the engine speed immediately decreases, this indicates that the mixture strength of the front carburettor is too weak.
c) the engine speed increases slightly and continues to run without change of speed, then the mixture strength is correct.
15 Repeat the above operation for the rear carburettor and after adjustment recheck the front carburettor as the two carburettors are interdependant.
16 A check on the correctness of the mixture adjustment is to listen to the exhaust note:-
a) An irregular note, splashy misfire and colourless emission indicates that the mixture is too weak.
b) a regular or rhythmical misfire and the emission of black smoke indicates that the mixture is too rich.
c) a regular and even note indicates that the mixture is correct.
17 To enrich the mixture, screw down on the jet adjusting nut (anti-clockwise) and to weaken the mixture screw up on the nut (clockwise).
18 Some adjustment of the slow running may now be required following adjustment of the mixture strength. To do this, adjust each throttle adjusting screw the same amount at the same time checking by hiss or by the meter that they remain in balance.
19 Set the throttle interconnecting clamping levers (item 7 in Fig.3.16) so that the link pin is 0.006" (0.15 mm) away from the lower edge of the fork as shown in the inset to Fig.3.16. Tighten the clamp bolts.
20 With the jet levers at their lowest position set the jet interconnection lever clamp bolts, 8 in Fig.3.16, so that both jets commence to move simultaneously.
21 Reconnect the mixture control wire with about 1/16" (1.6 mm) free movement before it starts to move the jet levers.
22 Operate the mixture control lever in the car until the linkage is about to move the carburettor jets and then adjust the fast idle screws, comparing the intensity of the air intake "hiss", to give an engine speed of about 1000 rpm when hot.
23 Refit the air cleaner and the air intake elbow to the carburettors and recheck for correct mixture as described in paragraph 14.

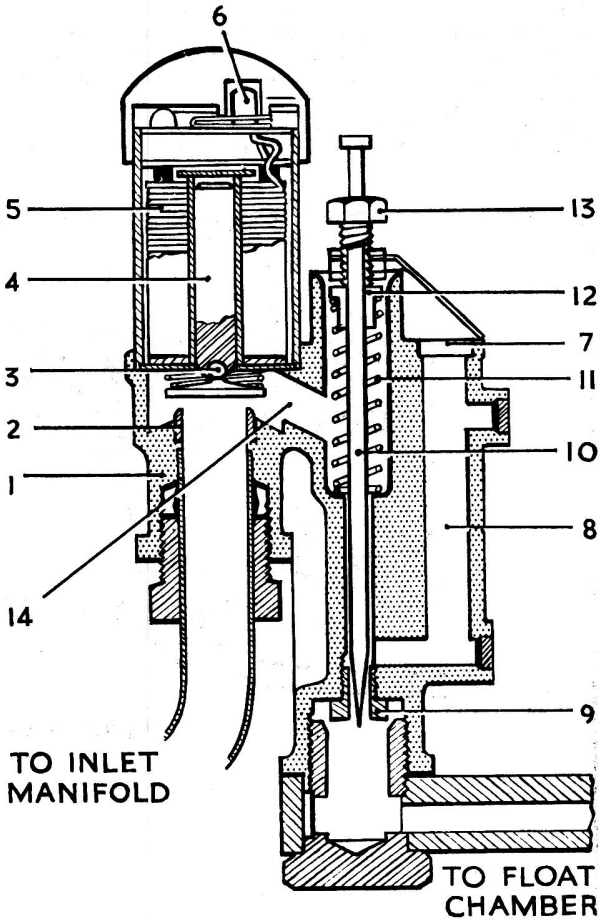

Fig.3.32. The auxiliary starting carburettor

37 The auxiliary starting carburettor - description

The auxiliary starting carburettor, is attached to the float chamber of the front HD 6 carburettor of the 3.4, 3.8 litre and 340 models, the parts forming the assembly to the carburettor are shown in Fig.3.32. It is a device for automatically enriching the mixture when starting from cold and is brought into action by a solenoid energised by a thermostatic switch located in the inlet manifold water jacket.

Fuel from the float chamber is supplied to the base of the jet (9) the size of which is governed by the position of the sliding needle (10) which is moved against the spring (11) by inlet manifold depression acting on the disc (12) attached to the shank of the needle. After passing the jet, the fuel is mixed with air drawn in from the intake (7) through the passage (8), the mixture is drawn past the needle into the passage (14) and thence, if the valve (3) is clear of its seating (2), into the inlet manifold. The thermostatic switch is connected to the solenoid through the terminal (6) and when the winding of the solenoid (5) is energised, the iron core (4), to which the valve is connected, is lifted thus allowing free passage of the mixture. When

the engine attains its normal running temperature the switch operates and de-energises the magnet to allow the valve to close.

38 The auxiliary starting carburettor - adjustment

1 Tuning of this device is confined to adjustment of the stop screw (13) which limits the downward travel of the needle (10).
2 Run the engine until it attains its normal running temperature.
3 Energise the solenoid by shorting the terminal of the thermostatic switch directly to earth with a screwdriver and at the same time flick open the throttles when the carburettor will be heard to come into operation with a pronounced hissing noise.
4 Adjust the stop screw (13) until the mixture is distinctly, but not excessively, rich ie until the exhaust gases are seen to be discernably black in colour, but just short of the point where the engine commences to run noticeable irregularity.
5 Anti-clockwise rotation of the stop screw will raise the needle and enrichen the mixture and screwing down on the screw will weaken the mixture.

39 The thermostatic switch - removal and refitting

The thermostatic switch which controls the operation of the auxiliary starting carburettor is situated at the front end of the inlet manifold water jacket, it operates the solenoid of the starting carburettor at temperatures below 30 – 35°C. It cannot be dismantled so if any fault arises there is no alternative but to fit a new item.
1 Disconnect the battery as a safety measure.
2 Drain sufficient water from the radiator to clear the inlet manifold water jacket.
3 Disconnect the electrical lead from the switch by undoing the chrome dome nut.
4 Remove the three securing setscrews and washers and withdraw the switch and the cork gasket.
5 Refitting is the reverse of the removal procedure but a new cork gasket must be fitted.
6 Top up the radiator to the correct level.

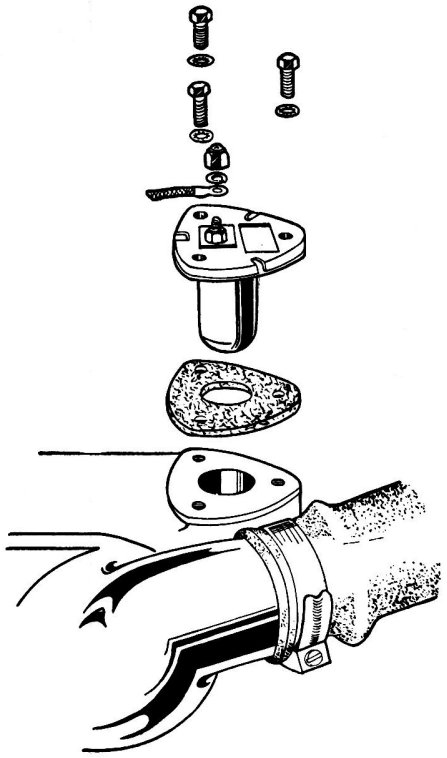

Fig.3.33. The auxiliary starting carburettor thermostatic switch

40 Fault diagnosis

Unsatisfactory engine performance is not necessarily the fault of the fuel system or the carburettors. Indeed, sluggishness, excessive fuel consumption etc: more commonly occur as the result of ignition faults so, before spending time in trying to trace a suspected fuel or carburation fault, it is advisable to first refer to Chapter 4 and check over the ignition system. The table below, therefore, assumes that the ignition system has been checked and is in order; the table should also be read in conjunction with Sections 7,15 to 21 and 26 to 30 of this Chapter.

Symptom	Reason/s	Remedy
Smell of petrol when engine is stopped	Leaking fuel lines or unions Leaking fuel tank	Repair or renew as necessary. Fill fuel tank to capacity and examine carefully at seams, unions and filler pipe. Repair as necessary.
Smell of petrol when engine is idling	Leaking fuel line unions between pump and carburettor Overflow of fuel from float chamber due to wrong level setting or ineffective needle valve or punctured float	Check line and unions, tighten and repair. Check fuel level setting and condition of float and needle valve, renew as necessary.
Excessive fuel	Worn needle	Renew needles.
Consumption for reasons not covered by leaks or float chamber faults	Sticking needle	Check correct movement of needle body.
Difficult starting, uneven running, lack of power, cutting out	One or more blockages Float chamber fuel level too low or needle sticking	Check fuel lines and clear. Dismantle and check.

Fuel pump not delivering sufficient fuel	Check pump delivery and clean or repair as required.
Intake manifold gaskets leaking or manifold cracked	Check tightness of securing nuts and inspect manifold.

Chapter 4 Ignition system

Contents

Specifications

Spark plugs		
Make		Champion
Type		
Mk 1 models		
7:1 comp: ratio		2.4 L7 (or L10S) / 3.4 L7 (or L10S)
8:1 comp: ratio		2.4 N5 (or NA8) / 3.4 N5 (or NA 8)
9:1 comp: ratio		2.4 — / 3.4 N5 (or NA 8)
Gap		2.4 0.030 in (0.76 mm) / 3.4 0.025 in (0.64 mm)
Mk 2 models*		
7:1 comp: ratio		2.4 N5 / 3.4 UN12Y
8:1 comp: ratio		2.4 N5 / 3.4 UN12Y
9:1 comp: ratio		2.4 — / 3.4 UN12Y
Gap		2.4 0.025 in (0.64 mm) / 3.4 0.025 in (0.64 mm)
3.8 litre* - all models		
Gap		0.025 in (0.64 mm)
*Champion N8 for USA Canada and Mexico		
240 models		N5
Gap		0.025 in (0.64 mm)
340 models		UN12Y
Gap		0.025 in (0,64 mm)
Firing order - all models		1, 5, 3, 6, 2, 4 (no 1 cylinder at rear of engine)
Distributor		
Make		Lucas
Serial no. and type		
2.4 Mk 1	7:1 comp: ratio	40557/A - DMBZ6A
	8:1 comp: ratio	40528/A - DMBZ6A
3.4 Mk 1	7:1 comp: ratio	40578/A - DMBZ6A
	8:1 comp: ratio	40576/A - DMBZ6A
	9:1 comp: ratio	40617/A - DMBZ6A
2.4 Mk 2	7:1 comp: ratio	40557/A - DMBZ6A
	8:1 comp: ratio	40528/B - DMBZ6A to engines BG 9999 and BH 8936 40884/A - 22D6 engine BH 8937 onwards
3.4 Mk 2	7:1 and 8:1 comp: ratio	40640/A - DMBZ6A to engines KG 9999 and KH 8332 40885/A - 22D6 to engines KH 9999 and KJ 6897 41063/A - 22D6 engine KJ 6898 onwards
	9:1 comp: ratio	41064/A - 22D6

3.8 litre	7:1 and 8:1 comp: ratio	40640/A - DMBZ6A to engines LA 9999, LB 9999, LC 5354 40885/A - 22D6 to engines LC 9999, LE 2046
	9:1 comp: ratio	41063/A - 22D6 engine LE 2047 onwards
240 models	8:1 comp: ratio	40665/A - DMBZ6A
340 models	8:1 comp: ratio	41208/B - 25D6
	9:1 comp: ratio	41063/A - 22D6 41064/A - 22D6

Note: - 22D6 distributors are a replacement for the DMBZ6A type

Cam dwell angle	35° ± 2°
Contact breaker gap	0.014 - 0.016 in (0.36 - 0.41 mm)
Contact breaker spring tension (measured at free contact)	18 - 24 ozs (512 - 682 gms)

Static ignition timing

Mk 1 models 2.4	7:1 comp: ratio	4° BTDC (1 1/3 flywheel teeth)
	8:1 comp: ratio	6° BTDC (1 3/4 flywheel teeth) with 40528A - DMBZ6A distributor the timing is 1° BTDC = 1/3 flywheel teeth.
3.4	7:1 comp: ratio	TDC
	8:1 comp: ratio	2° BTDC (2/3 flywheel teeth)
	9:1 comp: ratio	TDC

Mk 2 models and 240/340	2.4	3.4		3.8	
Type of air cleaner	Oil bath	Oil bath	Paper element	Oil bath	Paper element
7:1 comp: ratio	6° BTDC	TDC	TDC	TDC	TDC
8:1 comp: ratio	8° BTDC	2° BTDC	7°BTDC	4°BTDC	7° BTDC
9:1 comp: ratio	—	TDC	5°BTDC	10°BTDC	5° BTDC

240 model	12° BTDC
340 model	10° BTDC

1 General description

The ignition system is based on the supply of low tension voltage from the battery to the ignition coil it is converted into high tension voltage. The high tension voltage is powerful enough to jump the spark plug gap in the cylinders under high compression pressures providing that the ignition system is in good working order and that all adjustments are correct.

The ignition system comprises two individual circuits known as the low tension (LT) and the high tension (HT) circuits. The LT circuit, which is sometimes referred to as the primary circuit, comprises the battery, the lead to the control box, the lead to the ignition switch and from there to the low tension or primary coil windings of the coil (terminal SW), and the lead from the low tension coil windings (terminal CB) to the contact breaker points and condenser in the distributor.

The HT circuit consists of the high tension or secondary coil windings, the heavy ignition lead from the centre of the coil to the centre position in the distributor cap and thence via a carbon brush to the rotor arm and then through the spark plug leads to the spark plugs.

The system functions as follows. Low tension voltage is changed in the coil into high tension voltage by the opening and closing of the contact breaker points in the low tension circuit. HT voltage is then fed via the carbon brush in the centre of the distributor cap to the rotor arm of the distributor. The rotor arm revolves inside the distributor cap and each time it comes into line with one of the six metal segments in the cap, which are connected to the spark plug leads, the opening and closing of the contact breaker points causes the HT voltage to build up, jump the gap from the rotor arm to the appropriate metal segment and so via the lead to the spark plug ,where it finally jumps the spark plug gap before going to earth. The contact breaker points consist of one fixed and one free point. The free point bears on the shaft which carries the rotor arm and movement of this point is governed by the shape of the shaft which is hexagonal at the position where the point bears. As the shaft revolves, the free contact breaker point moves over one of the humps of the hexagon and is so brought out of contact with the fixed point.

The ignition is advanced and retarded automatically to ensure that the spark occurs at the right moment for the particular load at the prevailing engine speed.

The ignition advance is controlled both mechanically and by a vacuum operated system. The mechanical system comprises two lead weights, which act in the same manner as a governor, and which, due to centrifugal force, move out from the distributor shaft as the engine speed rises. As they move outwards they rotate a cam relative to the distributor shaft and so advance the spark. The weights are held in position by two light springs and it is the tension of the springs which is largely responsible for correct spark advancement.

The vacuum control consists of a diaphragm, one side of which is connected via a small bore tube to the inlet manifold and the other side to the contact breaker plate. Depression in the inlet manifold, which varies with engine speed and throttle opening, causes the diaphragm to move carrying with it the contact breaker plate and thus advancing or retarding the spark. A fine degree of control is achieved by a spring in the vacuum assembly. It will be seen from the Specification at the beginning of the Chapter that the type of distributor used varies with the model of the car. There is little or no outward difference in any of them and the above description and the following Sections apply to each of the types.

2 Contact breaker points - removal and replacement

1 If the contact breaker points are burned, pitted or badly worn, they must be replaced.

2 To remove the points first spring back the two clips (one at each side) holding the distributor cap to the body of the distributor. Lift off the cap and place it so that it is held clear of the distributor. Remove the rotor arm.

3 Unscrew the terminal nut securing the spring loaded free contact breaker arm. Remove both leads from the stud and the top insulating bush.

4 Lift off the contact breaker arm and remove the large fibre washer from the terminal pin.

5 Remove the two screws, in the case of the DMBZ6A distributor, or the single screw in the case of the 22D6 and 25D6 distributors, which hold the adjustable breaker arm and remove it.

6 If the contact points are dirty or are pitted they may be polished by use of a fine carborundum stone but it is essential that the faces are kept square and flat. Wipe away all dust after cleaning using a non-fluffy cloth moistened in petrol.

7 If a new set of points is being fitted it is essential that the

faces of the points are thoroughly cleaned with a non-fluffy cloth moistened in petrol in order to remove the preservative which will have been applied to them.
8 To replace the points, first position the adjustable contact breaker plate and secure it with its screw (s) and spring and flat washer.
9 Fit the large fibre washer to the terminal pin and then, bending the spring of the free contact breaker arm between the thumb and two fingers, fit the fibre of the arm to its pin and the eye of the spring to the terminal pin.
10 Insert the flanged nylon bush over the terminal pin and into the eye of the spring with the condenser lead immediately under its head and the low tension lead under that. Fit the steel washer and screw on the securing nut.
11 It is important to use the correct sized spanner for the nut and the correct sized screwdriver for the screws otherwise there is a possibility of these becoming "chewed-up" and making subsequent removal or replacement, difficult.
12 The gap of the contact breaker points must now be adjusted as described in the following Section.

3 Contact breaker points - adjustment

1 Remove the distributor cap and the rotor arm. If the rotor arm is difficult to move, it is permissable to lever on it, gently and evenly, with a screwdriver.
2 Remove the spark plugs to facilitate turning the engine to bring it to the required position.
3 Rotate the engine (by pulling on the fan belt or by using a spanner on the crankshaft damper securing nut) until the neck of the fibre body of the spring loaded contact breaker arm is on the peak of one of the hexagonal lobes of the distributor shaft.
4 Measure the gap between the contact breaker points. It should be 0.14" to 0.16" (0.36 to 0.41 mm). The gap must be adjusted if outside of those limits.
5 Refer to Fig.4.1 which illustrates the DMBZ6A type of distributor. The fixed plate is held by two screws (A) one of which passes through an elongated hole in the plate, Slacken these screws and rotate screw B, which is an eccentric headed adjusting screw, until the correct contact breaker gap is obtained. Now tighten screws "A".
6 Fig.4.2 illustrates the 22D6 and 25D6 type of distributor. Here the means of securing and adjusting the fixed plate is slightly different. The fixed plate is anchored at one end on a pin and is secured by a single screw "A". Slacken screw "A" and enter a screwdriver blade into one of the notches "B", turn the screwdriver to move the plate to obtain the correct gap. Tighten screw "A".
7 It is an elementary point, but do make sure that the blade of your feeler gauge is clean and free of oil because if the contact points are dirtied the result will be no spark at the plug.
8 Replace the rotor arm, the distributor cap and the spark plugs.

4 Condenser - removal, testing and replacement

1 The purpose of the condenser (capacitor) is to ensure that when the contact breaker points are open there is no sparking across them which would waste voltage and cause wear.
2 The condenser is fitted in parallel with the contact breaker points. If it develops a short circuit, it will cause ignition failure as the points will be prevented from interrupting the LT circuit.
3 If the engine becomes difficult to start, or begins to miss after several miles running, and the contact breaker points show signs of excessive burning, then the condition of the condenser must be suspect. A check can be made by separating the points when the ignition is switched "ON"; if this is accompanied by a flash, it is an indication that the condenser has failed.
4 Wihtout special test equipment, the only sure way to diagnose condenser trouble is to replace the suspect item with a new one and see if there is any improvement. Condensers are not expensive.
5 To remove the condenser from the distributor, remove the

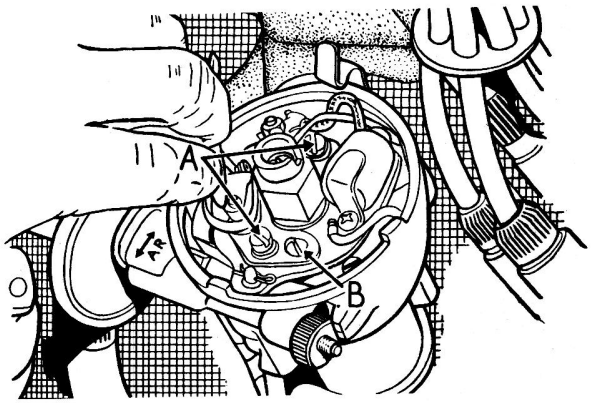

FIG.4.1. CHECKING CONTACT BREAKER GAP – DMBZ6A DISTRIBUTOR

A Screws securing fixed contact plate *B Eccentric headed adjusting screw*

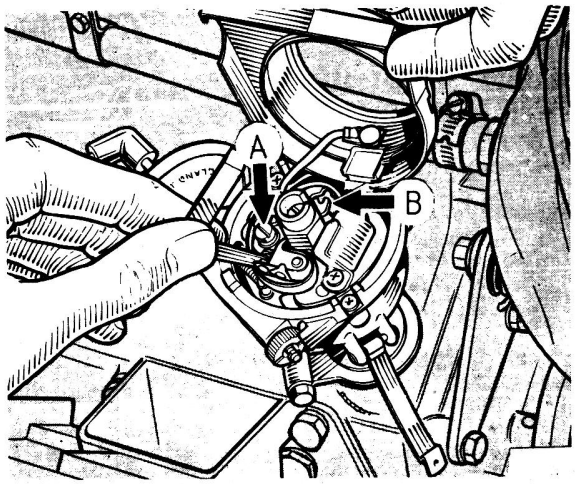

FIG.4.2. CHECKING CONTACT BREAKER GAP–22D6 AND 25D6

A Contact plate securing screw *B Adjusting notches*

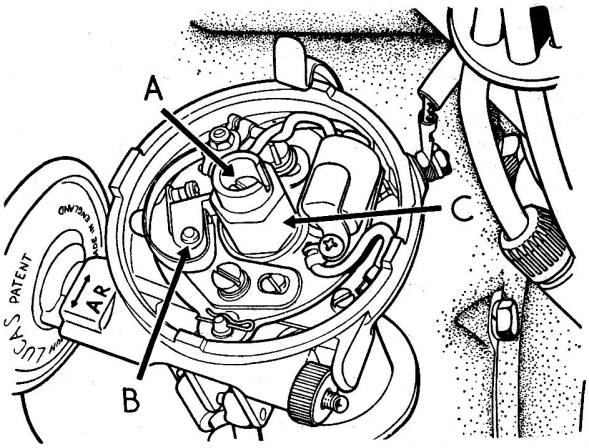

Fig.4.3. Distributor lubrication points

distributor cap and the rotor arm. Unscrew the contact breaker arm terminal nut, remove the nut and the flanged nylon bush. Remove the condenser lead.
6 Undo the condenser securing screw and lift away the condenser.
7 Replacement of the condenser is a reversal of the above procedure. Take particular care that the condenser lead does not short circuit against any part of the breaker point.

5 Distributor - lubrication

1 The distributor should be cleaned and lubricated periodically (every 2500 miles is recommended) But do not be over lavish with oil and under no circumstances allow it anywhere near the contacts.
2 Remove the distributor cap and the rotor arm.
3 Refer to Fig.4.3.
4 Lubricate the cam bearing by injecting a few drops of thin machine oil into the rotor arm spindle "A". Do not remove or slacken the screw inside the spindle - a space is provided beneath the head of the screw to allow the passage of thin lubricant.
5 Lubricate the post "B" with one drop of oil.
6 Lightly smear the faces of the cam "C" with clean engine oil or vaseline.
7 Lubricate the centrifugal timing control by injecting a few drops of thin oil through a convenient aperture in the contact breaker base plate.
8 Clean the distributor cap inside and out, with a soft dry cloth. Pay particular attention to the spaces between the terminals. Check that the carbon brush in the head of the cap can move freely in its holder. Rough, burned or blackened contacts can be cleaned with a fine carborundum stone or emery cloth. Remove metallic dust after cleaning the contacts by use of a cloth moistened in petrol.
9 Replace the rotor arm and the distributor cap.

6 Distributor - removal and replacement

1 For safety reasons, disconnect the battery.
2 Release the clips securing the distributor cap to the body and lift off the cap.
3 Remove the spark plugs.
4 Slowly turn the engine until the static timing marks coincide (see Section 10) and the rotor arm is pointing to the distributor cap segment which is connected to No.6 spark plug (front plugs).
5 Disconnect the low tension lead from the terminal on the side of the distributor.
6 Detach the vacuum pipe from the distributor advance unit.
7 Undo the screw securing the distributor clamp plate to the cylinder block. Remove the screw and the spring washer. The distributor may now be lifted up with the clamp plate still attached.
8 If it is not wished to disturb the ignition timing, then under no circumstances must the distributor clamp pinch bolt be loosened. Provided the distributor clamp is not moved and the engine is not turned when the distributor can be replaced without losing ignition timing.
9 Replacement is the reverse of the above sequence. If the engine has been turned or the distributor clamp has been disturbed it will be necessary to retime the ignition as described in Section 10.

7 Distributor - dismantling

1 Remove the distributor from the car as described in Section 6.
2 Refer to Fig. 4.4 which shows an exploded view of the distributor.
3 Remove the contact breaker points as described in Section 2 and remove the condenser as described in Section 4.
4 Remove the two screws securing the base plate and earth lead. Disconnect the link to the vacuum control unit and lift off the base plate.
5 Before proceeding any further, take careful note of the relative positions of the rotor arm slot located above the cam and of the offset driving dog. It is possible to assemble these items 180° out on reassembly which means that the distributor would have to be rotated 180° in order to obtain correct timing of the engine and connections cannot be made with the distributor so located.
6 Remove the cam retaining screw ("A" in Fig.4.3) and remove the cam.
7 Lift out the automatic timing control weights and their springs. Note how these are fitted.
8 Remove the circlip securing the knurled advance and retard adjustment nut. Remove the adjusting nut and spring. The vacuum unit can now be withdrawn.
9 Remove the clamp plate (but see Section 6 paragraph 8) by undoing the pinch bolt and sliding the plate off the base of the distributor.
10 To remove the driving dog, knock out the taper pin and lift off the dog and thrust washer. The shaft may now be lifted upwards.

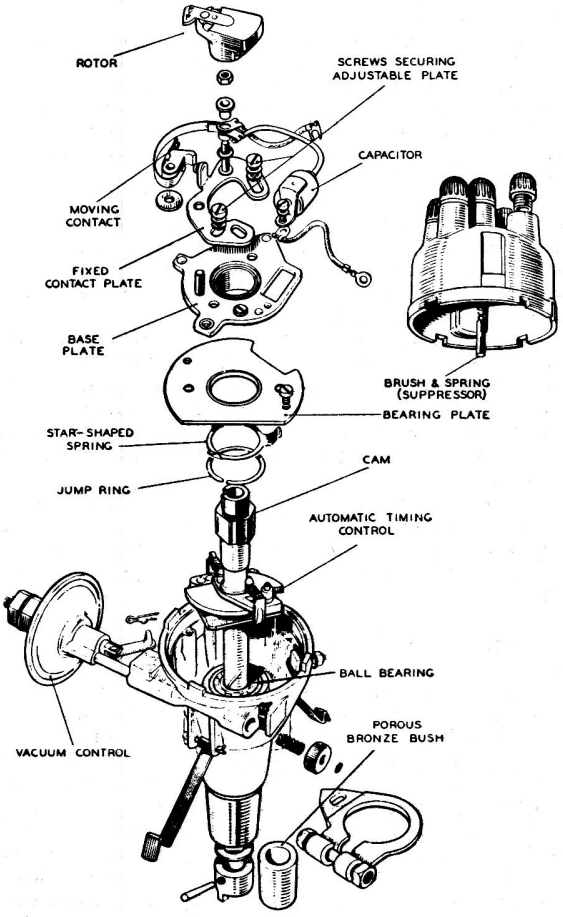

Fig.4.4. Exploded view of the distributor (type DMBZ6A illustrated)

8 Distributor - inspection and repair

1 Thoroughly wash all mechanical parts in petrol and wipe dry using a clean non-fluffy rag.
2 Check the contact breaker points as described in Section 2.
3 Check the distributor cap for signs of 'tracking' which will be indicated by a thin black line between the segments. Replace the cap if this defect is noted.
4 Examine the contacts in the cap. If they are rough, burned or blackened, clean them with a fine carborundum stone or fine emery cloth. Thoroughly clean the cap after rectification.
5 Ensure that the carbon brush in the cap is free to move in its holder and is not worn down. Do not remove the brush needlessly as the spring is usually a tight fit in the holder and will be badly stretched as you pull the brush out.
6 If the metal portion of the rotor arm is badly burned or is loose, renew the arm. Slight burning can be rectified with a fine file but maintain the face square.
7 Examine the fit of the contact breaker plate on the base plate and check the breaker arm pivot for looseness or wear. Renew the plate if necessary.
8 Examine the centrifugal weights and pivot pins for wear and renew the weights or cam assembly if a degree of wear is found.
9 Examine the shaft and the fit of the cam assembly on the shaft. If the clearance appears to be excessive, compare with new items and renew either or both if they show excessive wear.
10 If the shaft is a loose fit in the distributor bush and can be "rocked", we suggest that a reconditioned distributor is obtained. However, a new bush can be obtained and fitted to the DMBZ6A type of distributor but not to the types 22D6 or 25D6 for which there is no alternative but replacement of the complete distributor. The bearing bush is replaced as follows.
11 Drive out the old bush with a suitable punch.
12 Prepare the new bush for fitting by allowing it to stand completely immersed in a medium viscosity engine oil (SAE30 - 40) for at least 24 hours. The period of time can be shortened by soaking in oil heated to 100°C for 2 hours.
13 Press the new bush into the distributor body using a shouldered mandrel the shank of which should be approximately 0.0005" greater in diameter than the distributor shaft.

9 Distributor - reassembly

1 Reassembly is a straightforward reversal of the dismantling process. Note in addition:
2 Lubricate the centrifugal weights and other parts of the mechanical advance mechanism with thin machine oil. Lubricate the distributor shaft with clean egnine oil and smear the cam face with engine oil or vaseline. Do not be too lavish with the oil.
3 Check the action of the weights in the fully advanced and retarted positions, make sure they are not binding.
4 Adjust the micrometer advance and retard adjusting nut to bring the mechanism to the mid position of the timing scale.
5 Finally set the contact breaker points as described in Section 3.

10 Ignition - timing

1 The first step is to find out what timing marks are provided for the car. Later model cars have the timing marks engraved on the front face of the crankshaft damper and are used in conjunction with a pointer bolted to the crankcase. This method is illustrated in Fig.4.5, the zero line, when aligned with the pointer, indicates Top Dead Centre (TDC) of No.6 (front) piston and the graduations to the left are in degrees (up to 12 degrees in the case of the 240 model) before TDC. If a pointer cannot be seen below the crankshaft damper it means that your engine, probably an early model, is timed from a mark engraved on the plain portion of the starter ring. Look at the bottom of the clutch housing and there you will see a cover rivetted to the housing, push the cover to one side and the starter ring will be visible as also will a line on the clutch housing. When the line on the clutch housing and the line on the starter ring coincide, then No.6 piston (front) is at TDC. The timing in this case is taken from the number of teeth on the starter ring before TDC using the line on the housing as datum. This method is illustrated in Fig.4.6.
2 The next step is to be sure of the direction of rotation of the distributor rotor arm. It is anti-clockwise but to be clear in your own mind we suggest that the distributor cap is removed and, with the ignition switched off, press the button on the starter solenoid and observe the movement of the arm.
3 The engine has to be rotated, and brought to an exact position, this cannot be done with the spark plugs in position, so remove them.
4 Check that the micrometer advance/retard adjustment at the distributor is in the centre of the scale and that the contact breaker points are correctly set.
5 Place the car over a pit or raise the car to give access to either the crankshaft damper or the clutch housing.
6 You may find it possible to turn the engine by pulling on the

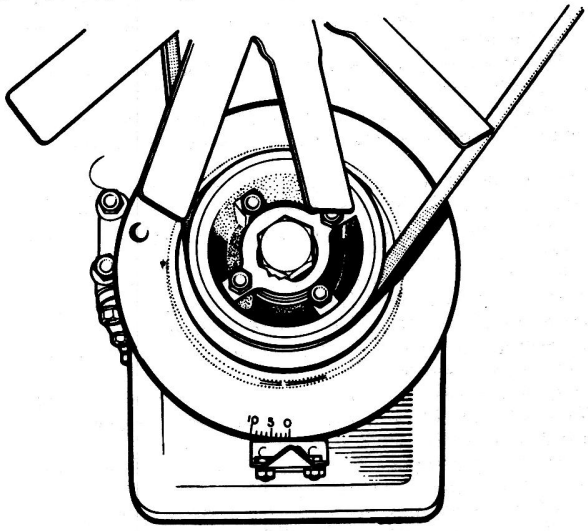

Fig.4.5. Ignition timing scale on the crankshaft damper

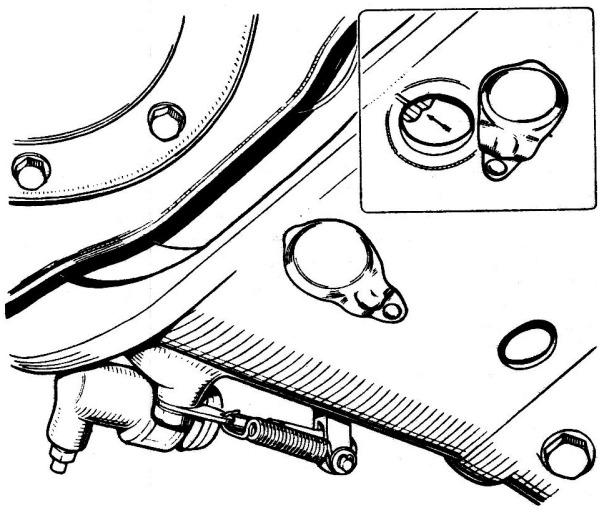

Fig.4.6. Ignition timing marks on flywheel and clutch housing

fan belt but we suggest that the method giving best control is to engage a socket spanner on the crankshaft damper centre bolt and to turn the engine from there. This method means that you are close to the damper, as is necessary, to observe the timing marks. But no matter what method is used. The services of an assistant will be required to watch positioning of the starter ring if the timing is from that point.

7 The engine is timed from No.6 cylinder i.e. the cylinder at the front of the block. Have an assistant place a thumb over the spark plug hole to that cylinder. Turn the engine and when suction is felt and then dies away it means that No.6 piston is coming up on the compression stroke.

8 Turn the engine slowly until the correct timing mark on the damper is aligned with the pointer or when the requisite number of teeth of the flywheel are aligned with the datum mark on the clutch housing. Remember that one third of a tooth equals one degree, or, from the root of one tooth to the root of the next equals 3^{o}. Refer to 'Specifications' at the beginning of this Chapter for timing data; it will be noted that figures for the 3.8 litre model are given in degrees but it is known that some early models are timed from the starter ring so the above conversion will have to be applied.

9 The rotor arm should now be pointing in the direction of No.6 cylinder segment of the distributor cap. Check that this is so, if the arm is 180^{o} out and the distributor has been stripped, it means that your assembly is incorrect (see Section 7 paragraph 5).

10 Slacken the distributor pinch bolt and turn the distributor, bearing in mind the direction of rotation of the rotor arm, until the contact breaker points are just commencing to open. Tighten the pinch bolt.

11 The only accurate way of judging when the points just open is to connect a 12 volt test lamp with one lead to the distributor terminal (or to the CB terminal of the ignition coil), and the other lead to a good earth. Switch on the ignition and the lamp will light when the points open.

12 The static timing of the ignition is now correct but it must be appreciated that this adjustment is nominal and final adjustments should be made under running conditions.

13 First start the engine and allow it to warm up to its normal running temperature, now accelerate in top gear from about 30 mph and listen for heavy pinking of the engine. If this occurs, the ignition needs to be retarded slighly until the faintest trace of pinking can be heard when accelerating very hard. Make your final adjustments on the vernier adjustment at the distributor but a maximum of six clicks to either advance or retard is allowed so if more is required it will have to be done by moving the distributor slightly. Movement of the distributor in the direction of rotation of the rotor arm will retard the ignition whilst movement against the rotation of the arm will advance it.

11 Spark plugs and leads

1 The correct functioning of the spark plug is vital for the proper running and efficient operation of the engine.

2 The plugs should be removed and thoroughly cleaned and the gap reset at intervals of not more than 2500 miles but more frequent cleaning will be required if the engine is in poor condition and giving rise to heavy fouling of the plugs. The most efficient method of cleaning plugs is by abrasive blasting in the Champion Service Unit but this is not always possible so use of a length of file card fastened to a block of wood is usually an acceptable substitute. Rub the plug vigorously on the card to remove all fouling and make sure that the sparking surfaces of the electrodes are clean and bright, if necessary open the gaps slighly and file the points with a point file keeping the surfaces parallel. After cleaning, blow out the interior of the plug remove all residue.

3 Use the wire brush to clean the threads.

4 Visually inspect the plug for cracked or chipped insulators, discard any suspect plug.

5 Reset the gap, to the dimension quoted in Specification at the beginning of this Chapter, using the special setting tool as illustrated in Fig.4.7. Do not apply pressure on the centre electrode as insulator fractures may result. Use the tool to obtain parallel sparking surfaces for maximum gap life.

6 Examine the gaskets. If the gaskets were excessively compressed, installed on dirty seats or distorted, leakage has probably occurred during service which would tend to cause overheating of the plug. The gasket should have a clean and flat surface, those which are approximately one half of their original thickness will be satisfactory but thinner ones should be renewed.

7 Finally clean the gasket seats in the cylinder head before installing the plugs to ensure proper seating of the spark plug gasket. Screw in the plug finger tight on to its gasket, if it cannot be seated on its gasket by hand, clean out the cylinder head threads with an old spark plug having two or three vertical flutes in the threads. Remember that you are screwing the plug into soft material so every care must be taken against cross threading.

8 Tighten the spark plug to a torque of 27 lb f ft (3.73 kg f m).

9 Examination of the firing end of the plug, noting the type of the deposit and the degree of electrode erosion will give a good indication of faults in the engine or the carburation and ignition system.

10 Refer to Fig.4.8.

11 A plug in normal condition will be obviously dry and will have light powdery deposits ranging from brown to greyish tan in colour. The electrodes may be worn slightly. All that is required for plugs in this condition is cleaning and regapping.

12 Oil fouling of a plug is usually indicated by wet, sludgy deposits due to excessive oil entering the combustion chamber past worn cylinders, rings and pistons or due to wear in the inlet valve stems or guides. Hotter spark plugs may alleviate oil fouling temporarily but engine overhaul is the only sure remedy.

13 Petrol fouling is indicated by dry, fluffy black deposits which result from incomplete combustion of the air/fuel mixture. The mixture being too rich or excessive use of the mixture control is indicated or, where fitted, a faulty automatic choke could be the cause. In addition, a defective coil, contact breaker points or plug cable can reduce the voltage supplied to the spark plug which will result in incomplete ignition. If the fouling is evident in only a few cylinders it may be that sticking valves is the cause but evidence of this will be given on "tick-over" and during normal running.

14 Burned or overheated plugs can be identified by a white burned or blistered insulator nose and badly eroded electrodes. Poor engine cooling or improper ignition timing may be the cause of the fault which can also arise from severe use such as sustained high speed or heavy loads.

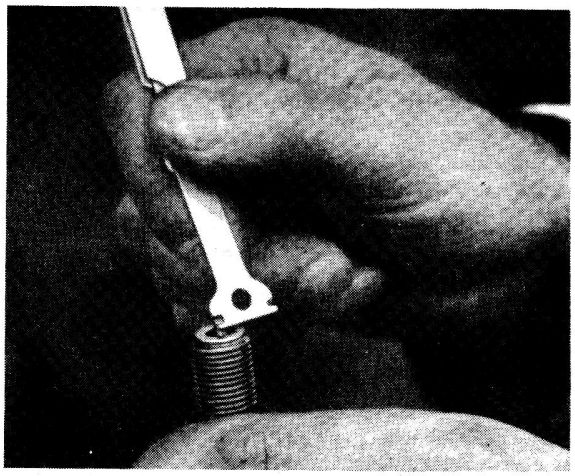

Fig.4.7. Setting the plug gap

15 The plug leads require no routine attention other than being kept clean and wiped over regularly. It is a good plan to remove them from the distributor, at the 10,000 mile servicing, by undoing the knurled terminal knobs or undoing the securing screws, as water can seep into these joints giving rise to a white corrosive deposit which, if present, must be carefully removed.
16 Finally, to get the best results from your engine, renew all plugs at 10,000 mile intervals. If the engine is in good condition the plugs will appear to be quite serviceable, and they probably are, but they have already given a useful life and in time some breakdown in insulation is inevitable even if it has not already occurred.

12 Ignition system - fault finding

By far the majority of breakdown and running faults are caused by faults in the ignition system, either in the low tension or in the high tension circuits. There are two main symptoms: either the engine will not start or fire or it is difficult to start and misfires. If it is a regular misfire i.e. one or more cylinders are not firing, the fault is almost certainly in the HT circuit. If misfiring is intermittent, the fault could be either in the HT or LT circuits. If the engine stops suddenly, or will not start at all, it is likely that the fault is in the LT circuit. Loss of power and overheating, apart from faulty carburation settings, are normally due to faults in the distributor or incorrect ignition timing.

13 Fault diagnosis - engine fails to start

1 If the engine fails to start and it was running normally when last used, first check that there is fuel in the tank. If the engine turns over normally on the starter and the battery is evidently well charged, then the fault may be in either the HT or LT circuit.
2 One of the commonest reasons for bad starting is wet or damp plugs, leads and distributor. Remove the distributor cap, if condensation is visible internally, dry the cap with a rag and wipe over the leads. Replace the cap.
3 If the engine still fails to start, check that current is reaching the plugs by disconnecting each plug lead in turn and holding the end of the lead about 3/16" away from the cylinder block. Switch on the ignition and spin the engine from the starter solenoid (hold the lead with the rubber to avoid shock).
4 Sparking between the lead and the block should be fairly strong with a regular blue spark. If sparking, it is obvious that current is reaching the plugs so remove them, clean and regap. The engine should now start.
5 Spin the engine as before, when a rapid succession of blue sparks between the end of the lead and the block indicates that the coil is in order and that either the distributor cap is cracked, the carbon brush in the cap is stuck or worn, the rotor arm is faulty, or the contact breaker points are burnt, pitted or dirty. If the points are in bad shape, clean and reset them as described in Section 3.
6 If there are no sparks from the end of the lead, then check out the connections of the HT lead from the coil to the distrbutor. If that is in order, check the LT lead from the coil to the distributor and then go on to check the leads in the distributor especially between the condenser and the breaker terminal. Make sure that the earth lead is satisfactory.
7 Cases occur of the neck of the fibre body of the spring loaded contact breaker fracturing where it bears on the distributor shaft, check this.
8 If everything is visually in order and the engine still refuses to start, a physical check of the circuit using a 20 volt voltmeter or a test lamp will have to be made.
9 Turn the engine so that the contact breaker points are fully open, switch on the ignition. Check that current is reaching the starter solenoid switch from the battery. No reading indicates a fault in the cable to the cable to the switch, or in the connections at the switch or at the battery terminals. Alternatively

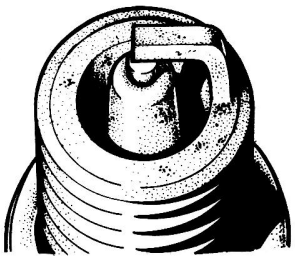

Fig.4.8. Normal condition

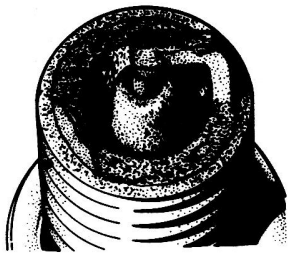

Fig. 4.9. Oil fouling or over-rich mixture

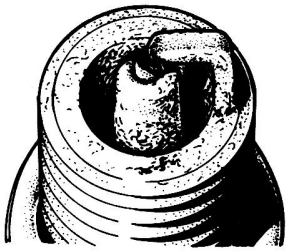

Fig. 4.10. Weak fuel mixture

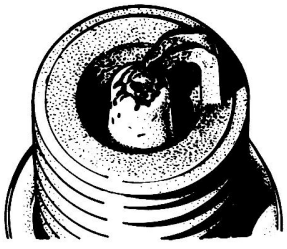

Fig. 4.11. Burning; due to pre-ignition or plug of wrong heat value

the battery earth lead may not be properly earthed to the body.

10 If in order, check that current is reaching the fuse unit AI terminal. Connect the lamp between the fuse unit and earth. If there is no reading, this indicates a loose cable or faulty connection between the solenoid switch and the fuse unit.

11 If in order, check between the control box terminal A1 and earth. No reading indicates a fault in the control box. The control box will have to be replaced.

12 Next check that current is reaching the switch by connecting the lamp to the switch input terminal A and earth. A faulty cable or loose connection is indicated if there is no reading.

13 The next check is between the fuse unit A3 terminal and earth. Again, no reading shows that there is a faulty connection or a broken cable.

14 Now check between the ignition coil terminal SW and earth. A faulty connection or broken cable is indicated if there is no reading.

15 Connect the lamp between the ignition coil terminal CB and earth. If there is no reading, the ignition coil is faulty.

16 Now connect the lamp between the distributor low tension terminal on the side of the distributor and earth. If no reading check the connection and the cable especially at the point where it joins the tag.

17 The final check of the LT circuit is to connect the lamp across the contact breaker points. No reading means an unserviceable condenser and when this is replaced, the car should start.

14 Fault diagnosis - engine misfires

1 If the engine misfires regularly, run it at a fast idling speed, and short out each plug in turn using a screwdriver with a **wooden or plastic insulated handle.**

2 No difference in the speed of the engine will be noticed when the defective cylinder is short circuited but short circuiting of those cylinders working properly will accentuate the misfire.

3 Remove the plug lead from the suspect cylinder and hold, by the insulation, about 3/16" away from the cylinder block. If the sparking is regular and fairly strong, the fault must lie in the plug.

4 The plug may be loose, the insulation may be cracked, the points may be badly set or the plug very badly fouled. Either renew the plug, or clean it and reset the gap.

5 If there is no spark at the end of the lead or if it is weak and intermittent, check the condition of the lead from the plug to the distributor. Renew the lead if the insulation is cracked or perished. If the lead is in good order, disconnect it at the distributor and see if it is wet. If it is wet, dry it and the housing in the distributor, it will be a good plan to remove all the other leads and make sure that moisture is not present.

6 If there is no spark at the lead, examine the distributor cap carefully for tracking. This can be recognised as a thin black line running between two or more electrodes or between an electrode and some other part of the distributor. These lines are paths which conduct electricity across the cap and let it run to earth. If faulty in this respect, the cap must be replaced.

7 Apart from the ignition timing being incorrect, other causes of misfiring allied to the ignition circuit have already been dealt with in the previous Section.