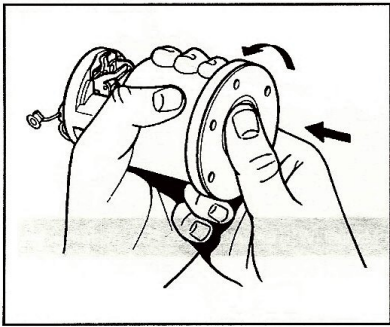
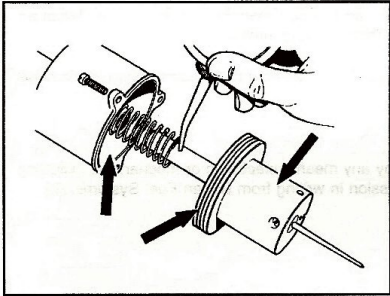
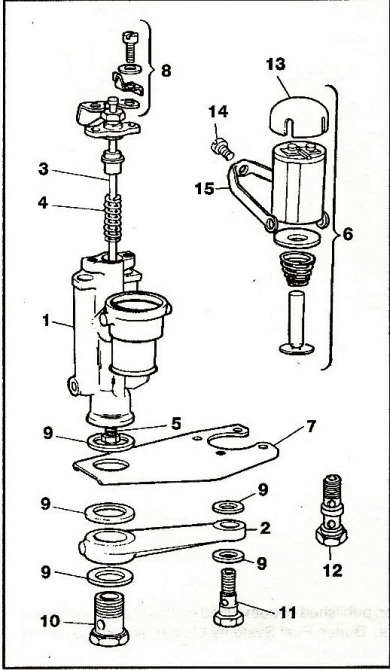
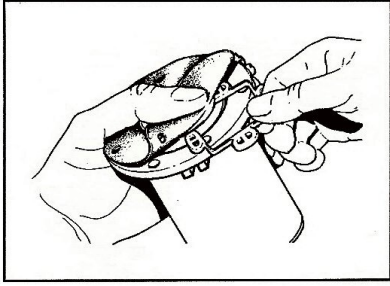


WORKSHOP MANUAL



WORKSHOP MANUAL

The technical information contained in this workshop manual supersedes any previous information published or authorized on this subject by Burlen Fuel Systems Ltd. All information given is up-to-date and accurate to the best of our knowledge. Burlen Fuel Systems Ltd can accept no liability for any loss, damage or injury caused by errors or omissions in this workshop manual.

Purchasers are advised that the specification details set out in this catalogue apply to a range of units and not to any particular unit. Burlen Fuel Systems Ltd reserve the right to vary their specifications with or without notice, and at such times and in such manner as they think fit. Major as well as minor changes may be involved in accordance with the Company's policy of constant product improvement.

When service parts are required it is essential that only genuine SU replacements are used. The Company can accept no responsibility for damage or injury caused by use of inferior service parts.

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Basic Principles of the SU Carburettor

The majority of car engines rely on carburettors to provide them with the finely atomized fuel/air mixture necessary for satisfactory performance. The carburettor must provide good atomization and the correct mixture strength under all operating conditions of the engine. The method used to do this in all carburettors is to speed up the velocity of the air by means of a venturi or choke and to use the consequent reduction of pressure in the venturi to draw fuel from the float chamber through a suitable jet orifice into the air stream.

The ideal carburettor is an instrument which when correctly tuned will supply its engine with the optimum mixture for maximum power throughout the full throttle range and for minimum consumption under all part-throttle conditions.

The Fixed Choke

When air is passed through a choke of fixed size its velocity and the depression over the fuel jet will vary with the demands of the engine. This varying depression makes it necessary to employ compensating devices to produce the correct fuel flow and also imposes a compromise on the choice of choke size in that too small an orifice will produce a restriction at the top end of the output range whilst a large orifice will cause poor metering and indifferent carburation at the lower end of the range.

The Variable Choke

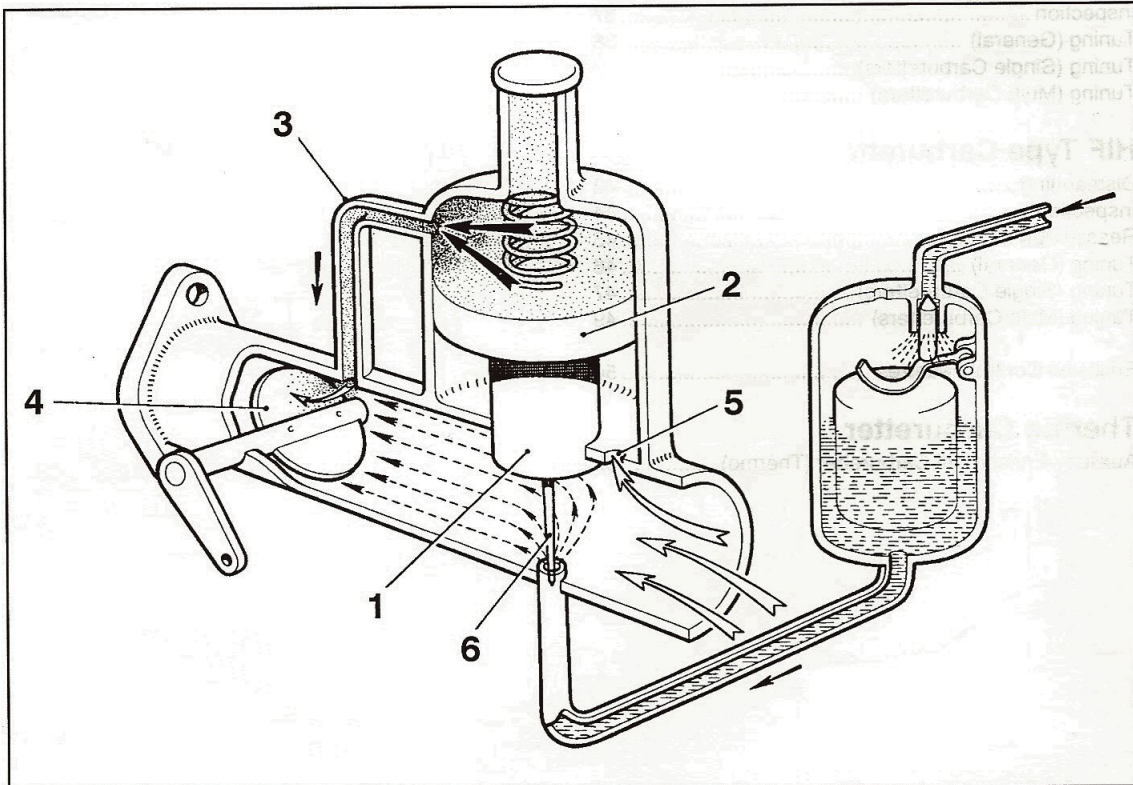
The principle of the variable choke carburettor is to employ a means whereby the effective choke orifice will expand as the demand increases, and contract when the demand diminishes. Such a variation in choke area will achieve a constant air velocity and depression over the jet.

Basic Construction

A variable choke orifice is obtained in the SU carburettor by the vertical movement of a close-fitting piston (1) positioned above the fuel jet in the centre of the body casting. A suction disc (2) is integral with the piston and works in a concentric chamber bolted to the top of the body casting.

Drillings in the under face or side of the piston, shown for simplicity as an external duct (3) communicate any depression existing in the space between the piston (1) and the throttle disc (4) to the chamber above the suction disc (2). The under side of the suction disc is vented to atmosphere or to the air cleaner by transfer holes located in the inlet flange, shown simply by the drilling (5).

As the choke orifice is varied over wide limits by the movement of the piston throughout the speed range, the fuel jet orifice must also be varied. This is achieved by



Basic Principles of the SU Carburettor

means of a tapered needle (6) attached to the piston and projecting into the jet. Correct discharge areas are obtained by the accurate dimensioning of this needle.

Opening the throttle disc (4) allows the manifold depression to be communicated to the body of the carburettor and also to the chamber above the suction disc. The piston will rise, allowing a mixture of air and fuel to pass underneath it to relieve the depression. The piston will continue to rise until the depression has reached a value which is just sufficient to balance the weight of the piston, together with the load exerted by the piston spring.

It will be appreciated that approximately the same depression can be obtained whatever the demand and that the piston height will be governed by the mass of mixture flowing beneath it. This depression is arranged to be of sufficient value to ensure that good atomization is obtained, but small enough to ensure adequate engine filling at high speeds.

Additions to the Basic Design

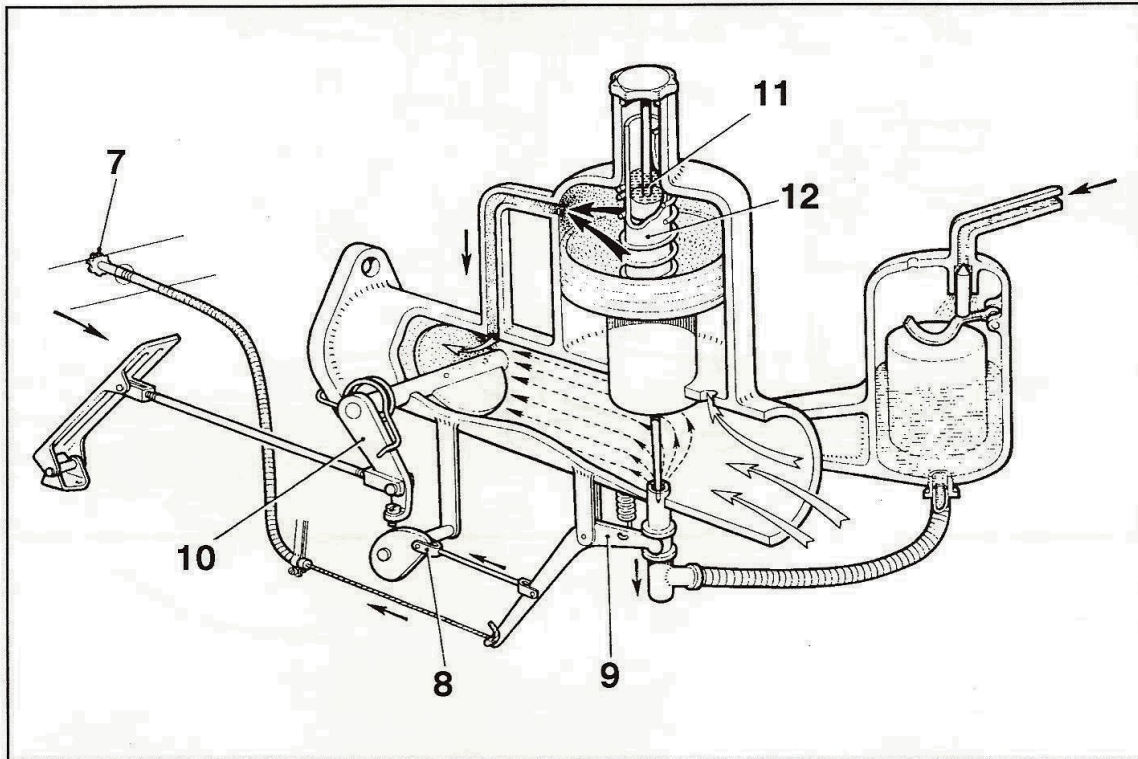
Operation of the cold start mixture control (7) will lower the jet down the needle (maximum movement $7/16$ " or 11 mm) exposing a large annulus and so providing the rich mixtures required for the cold start and initial 'warm up' period.

On later integral float (HIF) carburetters, the cold start enrichment is provided by means of a separate fuel path between the float chamber and the constant depression region close to the jet orifice. The fuel flow through this path is controlled by a rotary valve.

On most SU carburetters there is a connection (8) between the jet lever (9) and the throttle disc control (10). The connection is such that on operation of the coldstart/mixture control, the first few degrees of movement of the jet lever (9) open the throttle disc without moving the jet. Successive movement of the jet lever lowers the jet and opens the throttle disc by a further amount, providing enrichment.

A one-way valve is incorporated in the damper plunger (11) and this is fitted in an oil-fitted reservoir in the hollow piston rod (12). The piston damper assembly will restrict the rate by which the piston lifts, but will allow it to fall freely on throttle closure. The primary purpose of the piston damper is to provide the enrichment necessary for a satisfactory 'pick-up' during rapid opening of the throttle.

This enrichment is achieved by the damper retarding the speed of piston lift, thereby creating an additional depression over the jet which increases the amount of fuel discharged. When the engine is cold, the viscosity of the oil in the damper is high and the enrichment obtained is therefore greater than when the oil is warm.



Basic Principles of the SU Carburettor

Practical Application

The diagram shows a sectional representation of a type HS carburettor, float chamber moved out of position, which shows how the operation of the SU carburettor is achieved in practice.

The depression is communicated to the suction chamber (18) by means of the depression transfer drillings (16) in the bottom of the close-fitting piston (13).

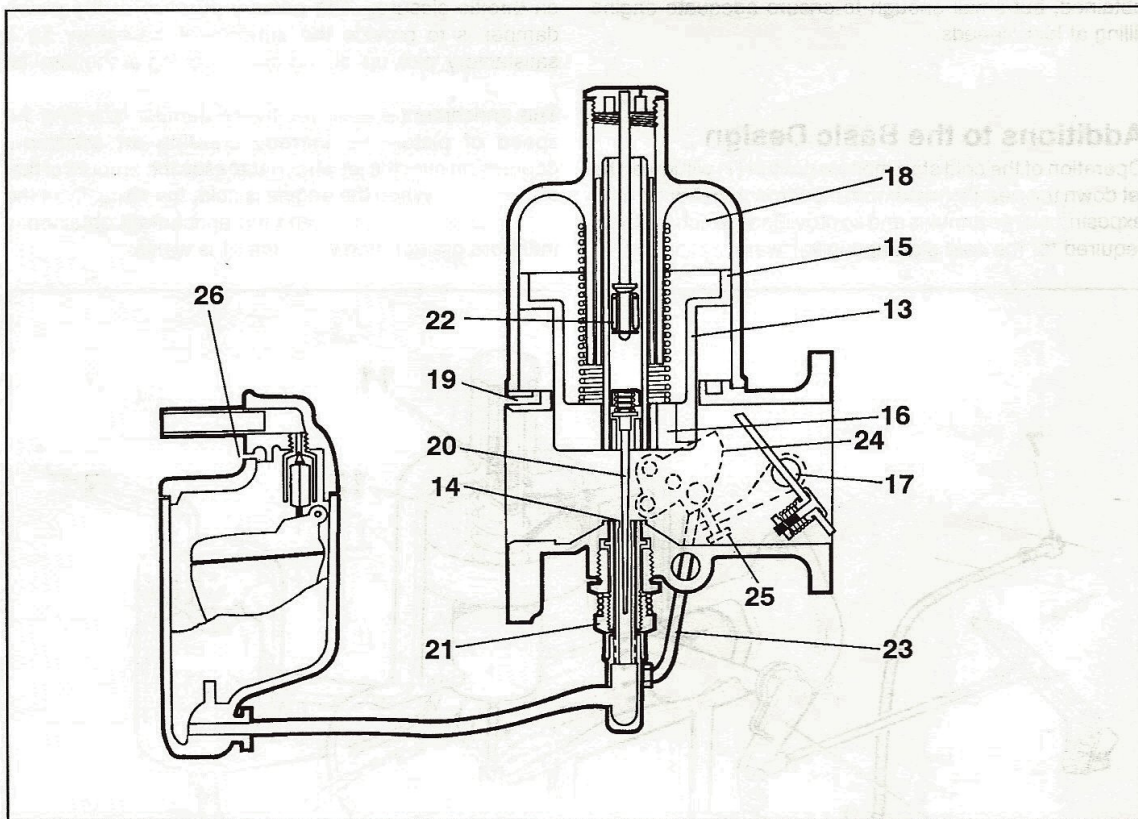
Cold start enrichment is provided by clockwise rotation of the fast-idle cam (24). This is usually effected by a Bowden-type flexible cable which is operated from a position convenient to the driver. Initial rotation of the cam takes up lost motion built into the jet drop link and brings the cam into contact with the fast-idle screw (25). This causes the throttle to start opening. Further rotation of the

cam increases the throttle opening still further and also pushes the link (23) which lowers the jet, thus providing enrichment.

The diagram also details the fuel jet (14), suction disc (15), throttle disc (17), atmospheric vent passage (19), jet needle (20), mixture adjusting nut (21), hydraulic damper (22) and float chamber vent (26).

The basic means of adjusting the carburettor are:

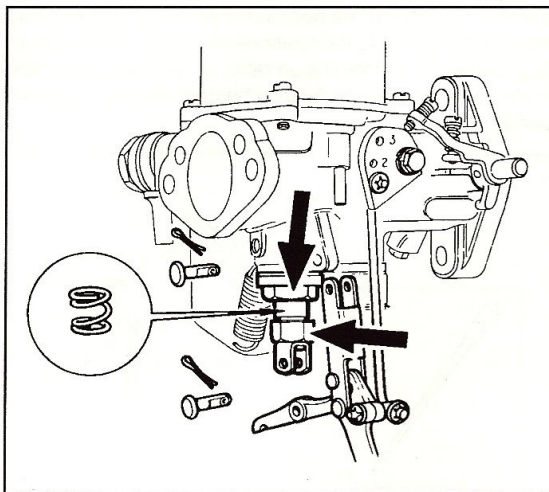
- Jet adjustment for mixture strength
- Slow run screw adjustment (not shown) for engine idling speed
- Fast-idle speed adjustment by means of fast-idle screw (25).



H Type Carburettor: Routine Servicing

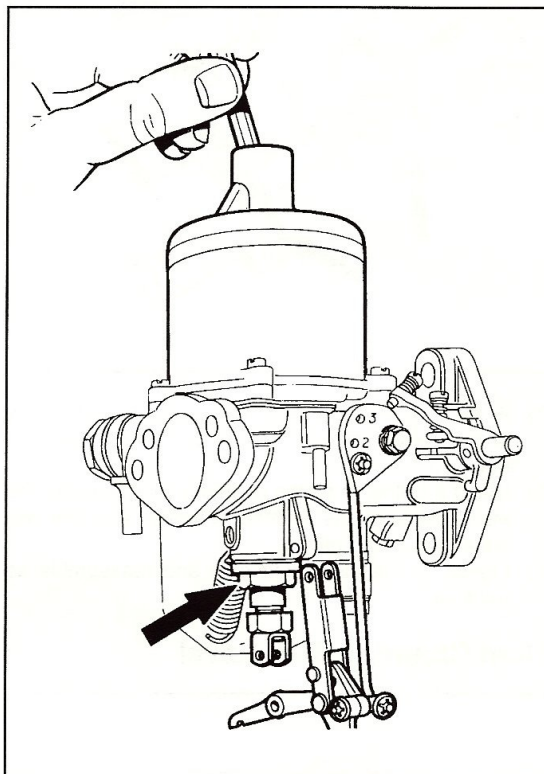
Jet centering

The piston should fall freely onto the carburettor bridge with a click when the lifting pin is released with the jet in the fully up position. If it will only do this with the jet lowered then the jet unit requires re-centring. This is done as follows:



1

- (a) Remove the jet control linkage and swing it to one side.
- (b) Mark for reassembly and withdraw the jet, remove the jet locking spring, replace the adjusting nut and screw it up as far as it will go.
- (c) Replace the jet, keeping the jet head in the correct relative position to the control lever.
- (d) Slacken the jet locking nut until the assembly is free to rotate.

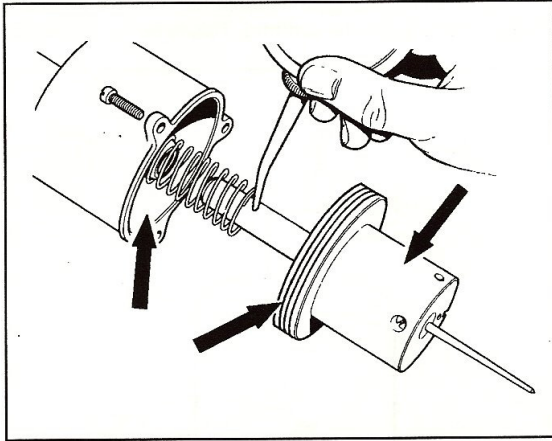


2

- (a) Remove the piston damper and apply pressure to the top of the piston rod with a pencil.
- (b) Tighten the jet locking nut keeping the jet head in the correct position and the jet hard up against the adjusting nut.
- (c) Finally check the action of the piston again.
- (d) Reassemble the controls.
- (e) Refill the piston dampers with thin engine oil as in tuning section (8).

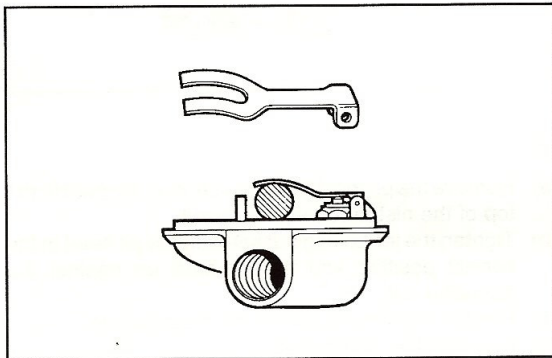
H Type Carburetter: Routine Servicing

Cleaning



- At the recommended intervals mark for reassembly and carefully remove the piston/suction chamber unit.
- Using a petrol or meths moistened cloth, clean the inside bore of the suction chamber and the two diameters of the piston.
- Lightly oil the piston rod only and reassemble as marked.

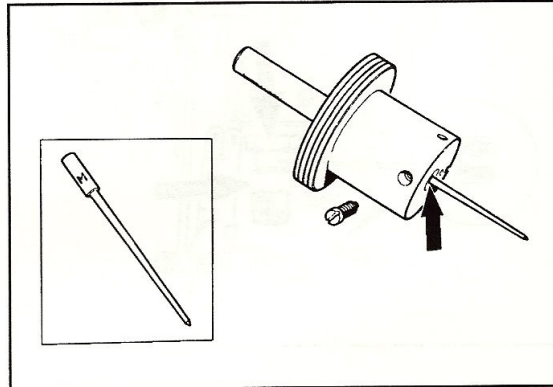
Float Chamber Fuel Level



- Remove the float chamber lid and invert it.
- With the needle on its seating insert a 11.0 mm (7/16 in) diameter round bar between the forked lever and the lip of the float chamber lid.
- The prongs of the lever should just rest on the bar. If not, carefully bend the lever until they do.

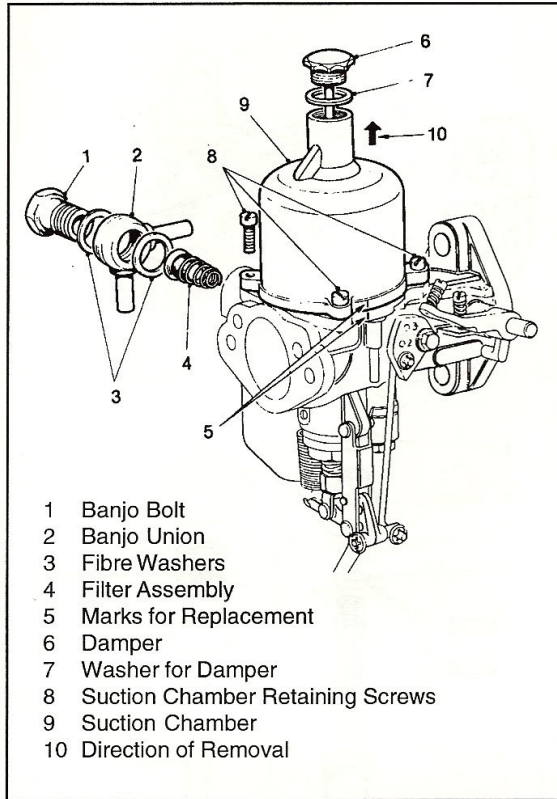
Needle size and position

The needle size is determined during engine development and will provide the correct mixture strength except when under extremes of temperature, humidity, or altitude; e.g. a weaker needle will be necessary at altitudes exceeding 1800 m (6,000 ft.) If modifications are made to the engine: (e.g. camshaft, compression ratio, air cleaner or exhaust system) a different needle may be necessary to maintain performance.



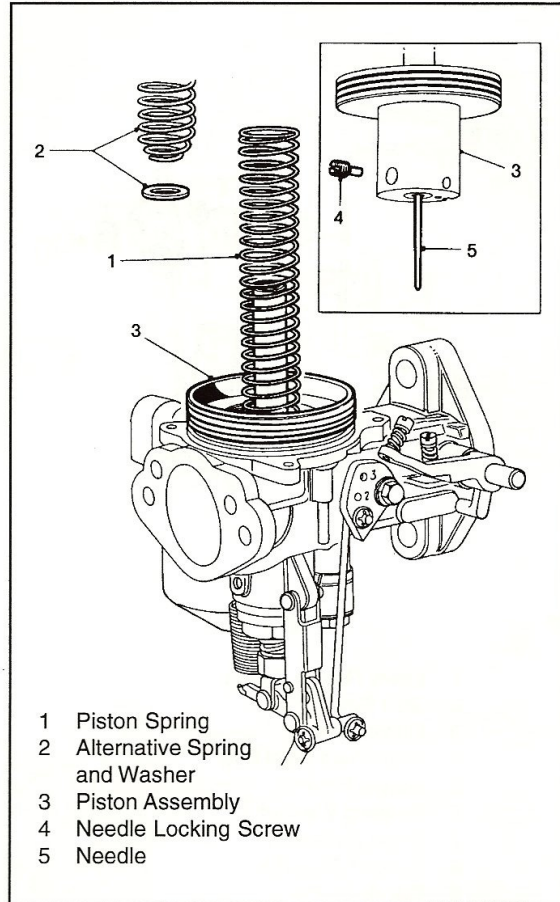
- To check the needle fitted, remove the piston/suction chamber unit.
- Slacken the needle clamping screw, extract the needle, and check its identifying mark against the recommendation.
- Fit the correct needle and lock it in position so that the shoulder on the shank is flush with the piston base.
- Reassemble the piston/suction chamber unit.

H Type Carburettor: Dismantling



1

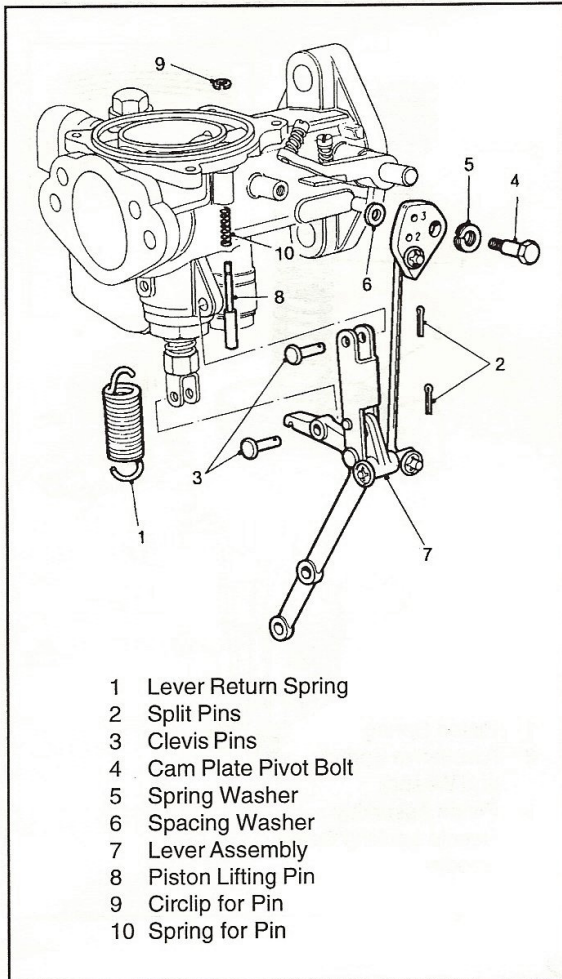
- (a) Thoroughly clean the outside of the carburettor.
- (b) Remove the banjo bolt, banjo union and fibre washers. Extract the filter and spring assembly from inside the inlet of the float chamber lid.
- (c) Mark the relative positions of the suction chamber and the body.
- (d) Remove the damper and its washer. Unscrew the chamber retaining screws.
- (e) Lift off the chamber without tilting it.



2

- (a) Remove the piston spring and washer (when fitted).
- (b) Carefully lift out the piston assembly and empty the damper oil from the piston rod.
- (c) Remove the needle locking screw and the needle. If the needle cannot be easily removed, first tap it inwards and then pull it out, do not bend it.

H Type Carburettor: Dismantling



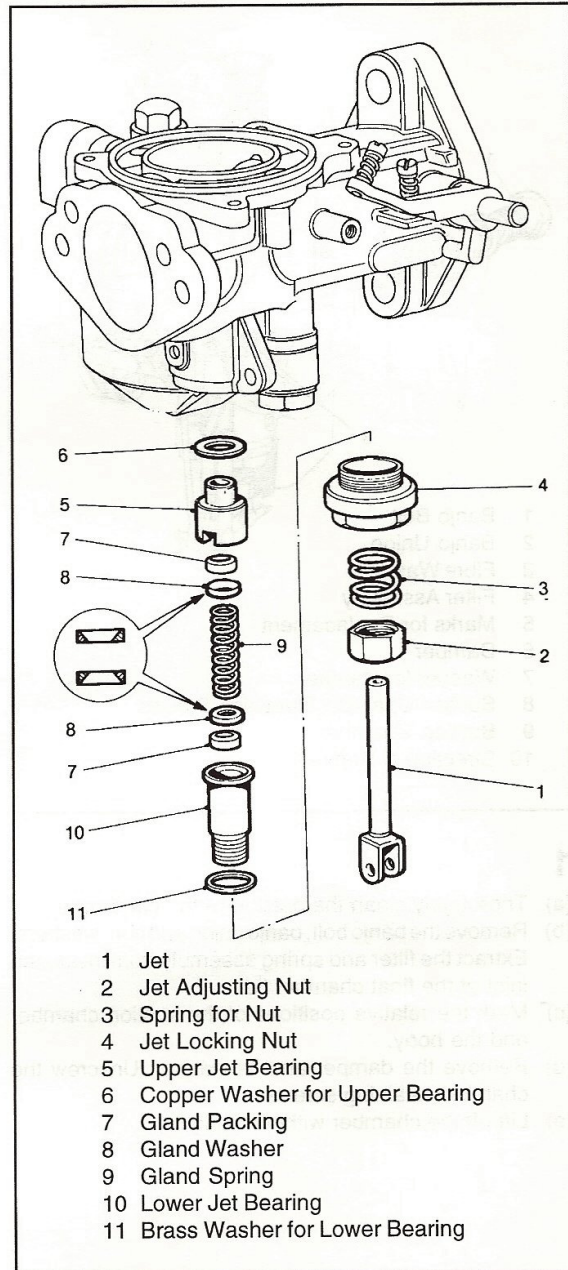
- 1 Lever Return Spring
- 2 Split Pins
- 3 Clevis Pins
- 4 Cam Plate Pivot Bolt
- 5 Spring Washer
- 6 Spacing Washer
- 7 Lever Assembly
- 8 Piston Lifting Pin
- 9 Circlip for Pin
- 10 Spring for Pin

3

- (a) Unhook the lever return spring. Remove the split pins and clevis pins.
- (b) Remove the fast-idle cam pivot bolt. Note the positions of the double-coil spring washer and the aluminium spacing washer.
- (c) Detach the linkage assembly.
- (d) Press up the piston lifting pin, extract the circlip from its groove and withdraw the pin and its spring downwards.

4

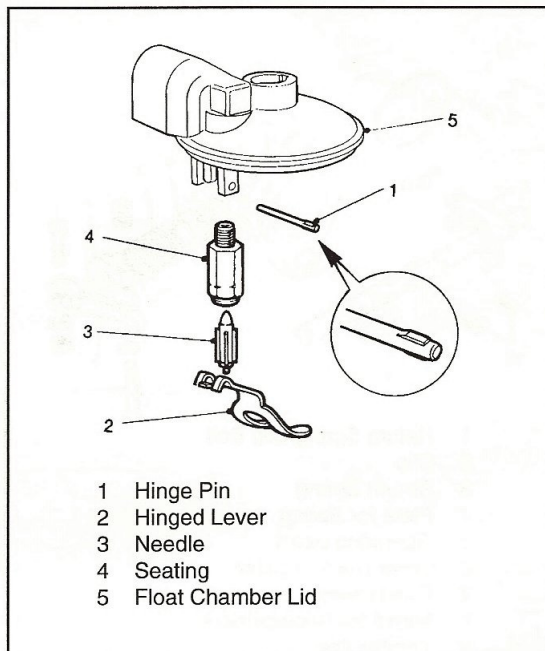
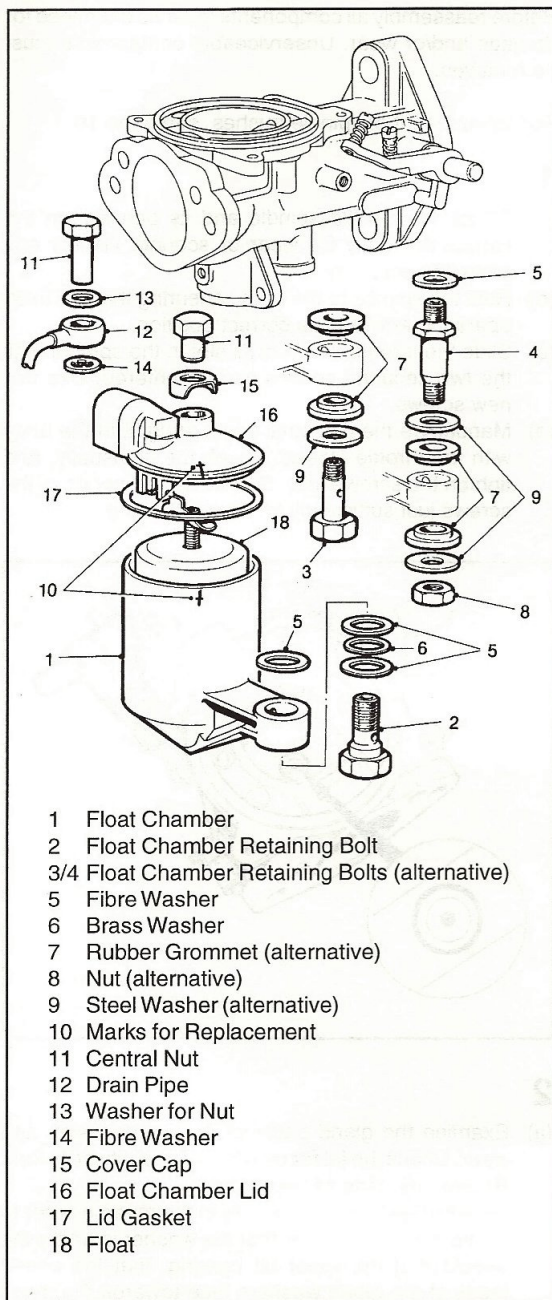
- (a) Withdraw the jet downwards.
- (b) Detach the jet adjusting nut and spring.
- (c) Unscrew the jet locking nut and withdraw the assembly carefully.



- 1 Jet
- 2 Jet Adjusting Nut
- 3 Spring for Nut
- 4 Jet Locking Nut
- 5 Upper Jet Bearing
- 6 Copper Washer for Upper Bearing
- 7 Gland Packing
- 8 Gland Washer
- 9 Gland Spring
- 10 Lower Jet Bearing
- 11 Brass Washer for Lower Bearing

- (d) Lift off the upper jet bearing and copper washer. From inside the bearing extract the gland and brass gland washer.
- (e) Remove the gland spring and withdraw the lower jet bearing from the jet locking nut. Note the brass washer under the shoulder of the bearing. Extract the gland and brass gland washer from inside the bearing. Do not disturb the jet locking nut cork washer.

H Type Carburettor: Dismantling



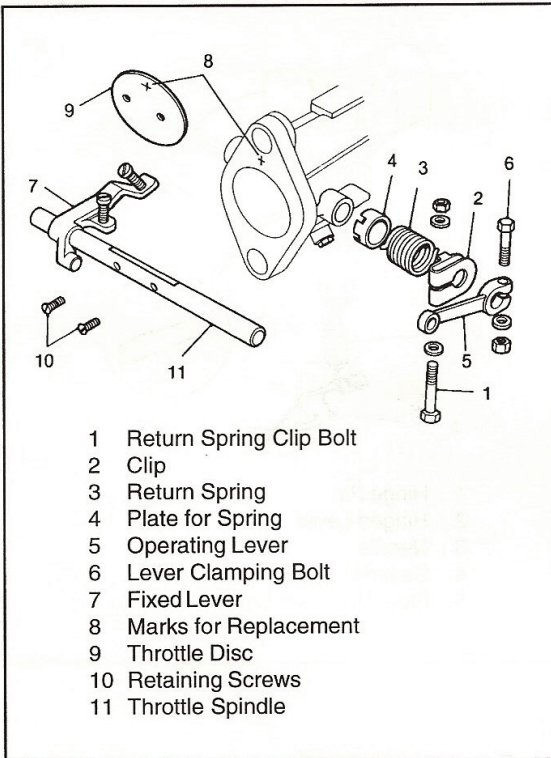
5

- Remove the screw retaining the stay to the carburettor body (when fitted). Remove the bolt or nut retaining the float-chamber to the body. Note the positions of the three fibre washers and the brass washer, or alternatively, the position of the rubber grommets and steel washers.
- Mark the relative position of the floatchamber and lid. Unscrew the central nut and remove the drain pipe and washers; the stay, washer and cover cap, or the cover cap alone, as is fitted to the individual carburettor. Note the relative positions of the washers and other components. Lift off the lid, noting the gasket between the lid and the chamber.
- Invert the float-chamber to remove the float.

6

- Push out the hinge pin of the hinged lever from the end opposite to its serrations and detach the lever.
- Lift out the needle from its seating and unscrew the seating from the lid using a box spanner 8.58 mm (0.338 in) across the flats. Take great care not to distort the seating.

H Type Carburettor: Dismantling, Reassembly

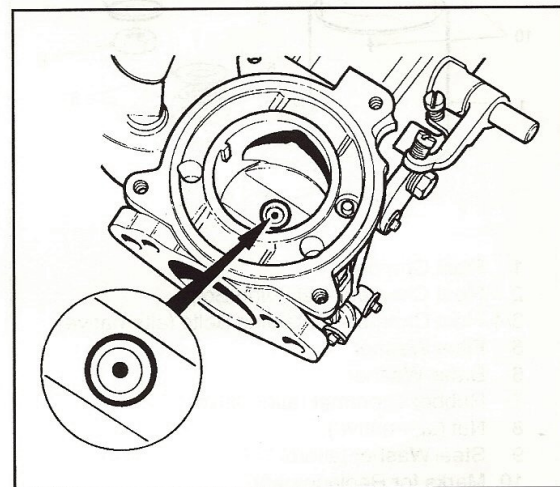


Before reassembly all components must be examined for damage and/or wear. Unserviceable components must be renewed.

For replacement of spindle bushes, see page 19.

1

- Check the throttle spindle and its bearings in the carburettor body for wear or scoring. Renew any parts as necessary.
- Refit the spindle to the body, ensuring that the fixed operating arm is in its correct position.
- Slide the throttle disc into its slot in the spindle until the two securing screws can be entered. Use two new screws.
- Manoeuvre the disc until it is a snug fit in the body with the throttle closed. Check the fit visually, and tighten the screws fully. Spread the split ends of the screws just sufficiently to prevent turning.



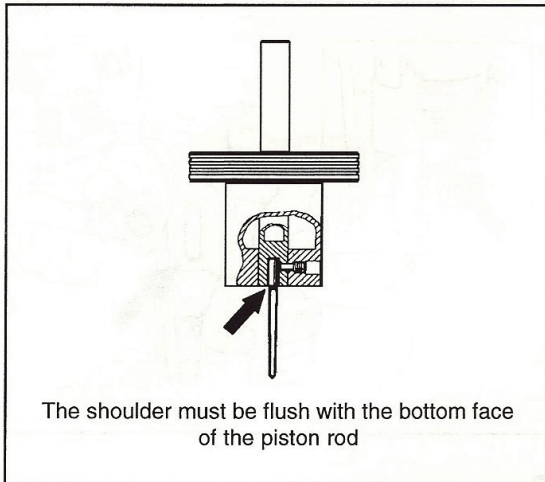
7

- Slacken the spring clip bolt and remove the clip, spring, and return spring plate (when fitted). If a clamp-type operating lever is fitted, slacken the clamping bolt and remove the lever.
- Close the throttle and mark the position of the throttle disc.
- 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 not withdrawn carefully.
- Withdraw the spindle from the carburettor body.

2

- Examine the gland packings for compression and wear. Check the jet for ovality and security of its fork. Renew any parts as necessary.
- Reassemble the jet assembly in the reverse order to its dismantling. Ensure that the washer is under the shoulder of the lower jet bearing, that the coned faces of the gland washers face towards the gland packing, and that the copper washer is fitted with its sharp edge towards the upper jet bearing.
- Refit the assembly to the carburettor body but leave the jet locking nut slack.
- When the jet is correctly centred (see illustration) it may appear offset from the centre of the jet bearing drilling.

H Type Carburettor: Reassembly



3

- (a) Examine the piston assembly for damage to the piston rod and the outside surfaces of the piston. Check the piston key for security in the carburettor body. The piston must be scrupulously clean. Use either petrol or methylated spirits. Do not use abrasives.
- (b) Examine the needle for damage or signs of wear. Refit the needle to the piston. The shoulder should be level with the face of the piston rod (see illustration). Fit and tighten the locking screw. Fit the piston assembly to the suction chamber, invert the complete assembly and spin the piston to check for concentricity of the needle.
- (c) Refit the piston assembly to the carburettor body, taking care not to damage the needle.
- (d) Replace the washer (when fitted) and piston spring in position over the piston rod.

4

- (a) Clean inside the suction chamber and the piston rod guide using petrol or methylated spirit.
- (b) Lightly oil the outside of the piston rod, and refit the suction chamber in its original position as marked on dismantling.
- (c) Fit and tighten the securing screws.
- (d) Centralize the jet (see page 7).
- (e) Refit the damper and washer. Do not fill with oil at this stage.

5

- (a) Examine the float needle and seating; renew if faulty.
- (b) Refit the seating to the float-chamber lid, taking care not to distort or overtighten. Put the needle into the seating, coned end first. Test for leakage with air pressure.
- (c) Refit the hinged lever and hinge pin.
- (d) Check the float level (see page 8).

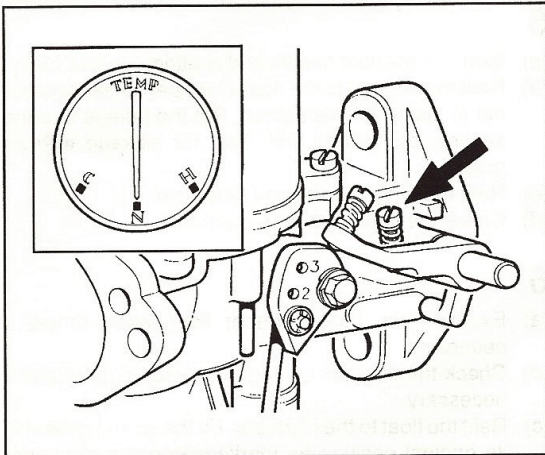
6

- (a) Examine the float-chamber lid gasket; renew if necessary.
- (b) Check the float for damage or puncturing; renew if necessary.
- (c) Refit the float to the chamber. Fit the lid and gasket in its original position as marked. Replace the cover cap and nut or cover cap, stay, washer and nut; or drain pipe, washers and nut, as appropriate to the carburettor. Do not overtighten.
- (d) Refit the float-chamber assembly to the carburettor body. Ensure that the fibre washers or rubber grommets are in good condition. Check that the washers are in their correct positions. Insert the rubber grommets in the float-chamber banjo and then push the bolt through them (when fitted).
- (e) Insert the filter assembly, spring end first, and refit the banjo and bolt together with the fibre washers. Note that the recessed face of the banjo fits toward the hexagon end of the bolt.

7

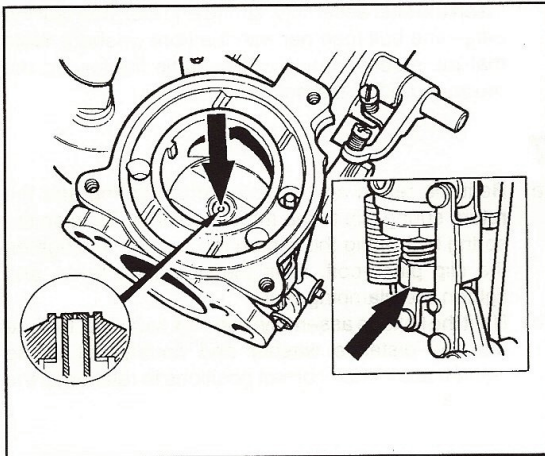
- (a) Refit the return spring plate, return spring and the return spring clip to the throttle spindle. Tension the spring by turning the clip on the spindle and tighten the clip pinch-bolt. Refit the operating lever, and tighten the clamping bolt.
- (b) Refit the linkage assembly; use new split pins. Ensure that the distance washer and double-coil spring washer are in their correct positions in relation to the fast-idle cam.

H Type Carburettor: Tuning (Single Carbs)



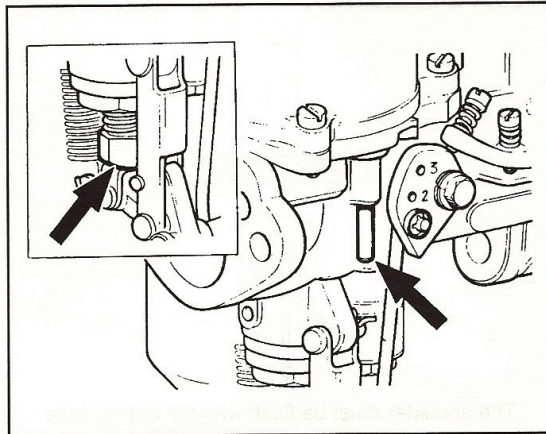
1

- (a) Warm engine up to normal temperature.
- (b) Switch off engine.
- (c) Unscrew the throttle adjusting screw until it is just clear of its stop and the throttle is closed.
- (d) Set throttle adjusting screw 1.5 turns open.



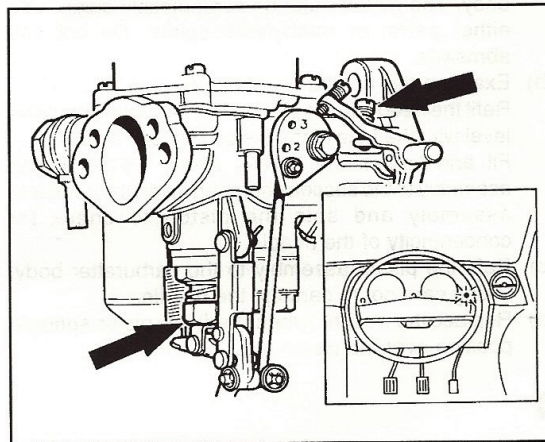
2

- (a) Mark parts for reassembly and remove piston/suction chamber unit.
- (b) Disconnect mixture control wire.
- (c) Screw the jet adjusting nut until the jet is flush with the bridge of the carburettor or fully up if this position cannot be obtained.



3

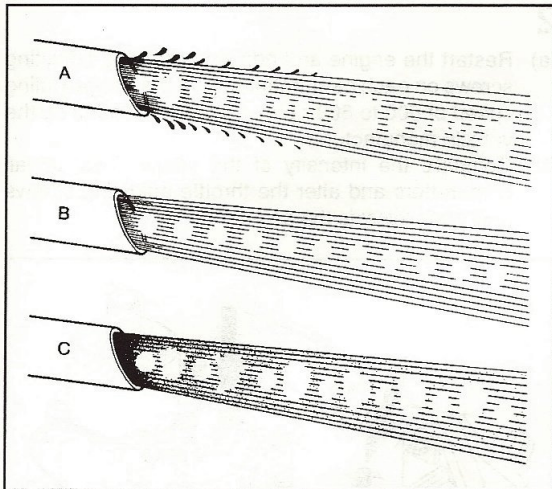
- (a) Replace the piston/suction chamber unit as marked.
- (b) Check that the piston falls freely onto the bridge when the lifting pin is released. If not, see page 7.
- (c) Turn down the jet adjusting nut 1.5 turns.



4

- (a) Restart the engine and adjust the throttle adjusting screw to give desired idling as indicated by the glow of the ignition warning light.
- (b) Turn the jet adjusting nut up to weaken or down to enrich until the fastest idling speed consistent with even running is obtained.
- (c) Re-adjust the throttle adjusting screw to give correct idling if necessary.

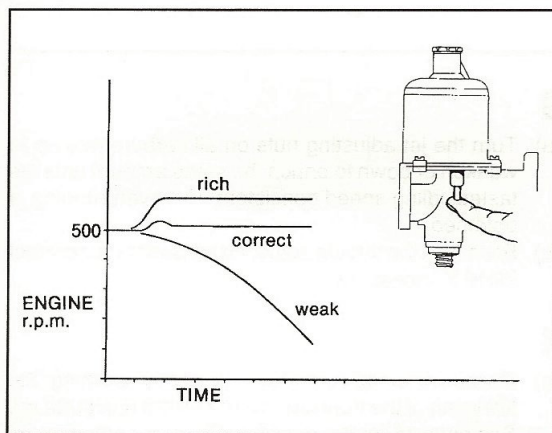
H Type Carburettor: Tuning (Single Carbs)



5

The effect of mixture strength on exhaust smoke

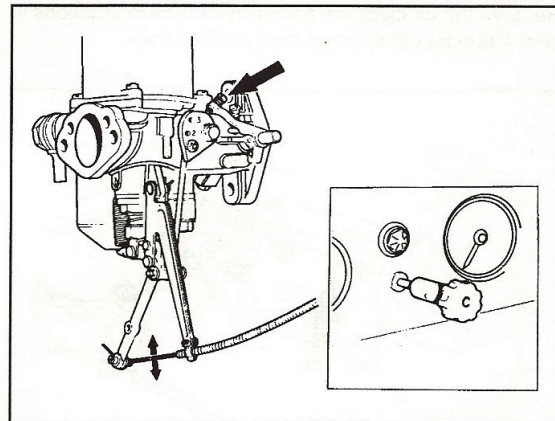
- A. TOO WEAK: Irregular note, splashy misfire, and colourless.
- B. CORRECT: Regular and even note.
- C. TOO RICH: Regular or rhythmical misfire, blackish.



6

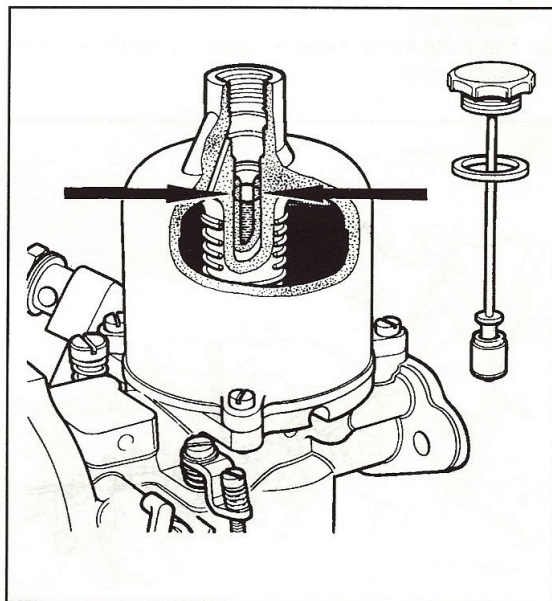
- (a) Check for correct mixture by gently pushing the lifting pin up about 0.8 mm (1/32 in).
- (b) The graph illustrates the effect on engine r.p.m. when the lifting pin raises the piston, indicating the mixture strength.

RICH MIXTURE: r.p.m. increase considerably.
CORRECT MIXTURE: r.p.m. increase very slightly.
WEAK MIXTURE: r.p.m. immediately decrease.



7

- (a) Reconnect the mixture control wire with about 1.6 mm (1/16 in) free movement before it starts to pull on the jet lever.
- (b) Pull the mixture control knob until the linkage is about to move the carburettor jet and adjust the fast-idle screw to give an engine speed of about 1,000 r.p.m. when hot.

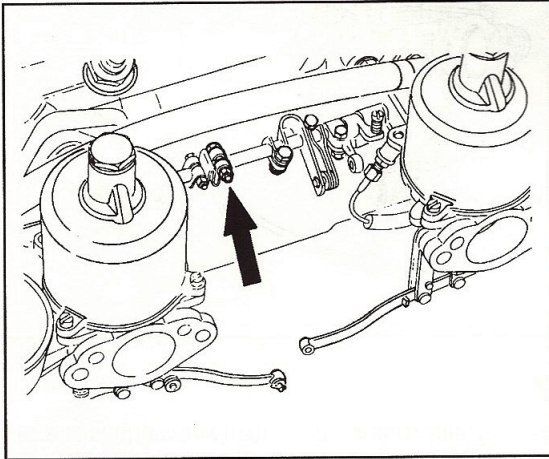


8

Finally top up the piston damper with thin engine oil of grade S.A.E. 20 until the level is just below the top of the hollow piston rod.

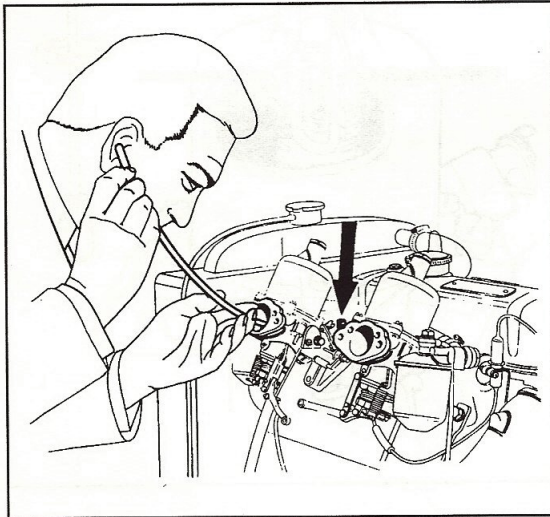
H Type Carburetter: Tuning (Multi-Carbs)

Remove the air cleaners and carry out the instructions in item 1 (single units) on all carburetters then:



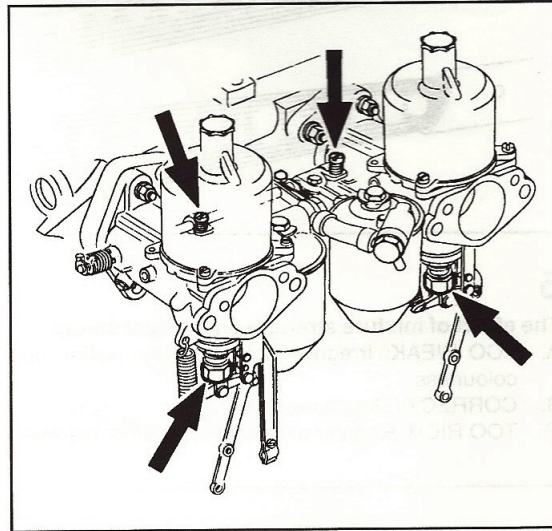
1

- Slacken one of the clamping bolts on the throttle spindle interconnections.
- Disconnect the jet control linkage by removing one or, in the case of triple carburetters, two of the linkage swivel pins.
- Carry out items 2 and 3 (single carburetters), then additionally:



2

- Restart the engine and adjust the throttle adjusting screws on each carburetter to give the desired idling speed of 500 to 600 r.p.m. as recommended by the vehicle manufacturer.
- Compare the intensity of the intake 'hiss' on all carburetters and alter the throttle adjusting screws until each 'hiss' is the same.



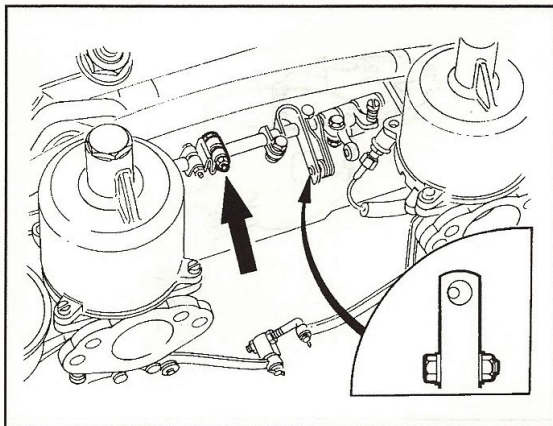
3

- Turn the jet adjusting nuts on all carburetters up to weaken or down to enrich the same amount until the fastest idling speed consistent with even running is obtained.
- Re-adjust the throttle adjusting screws to give correct idling if necessary.

4

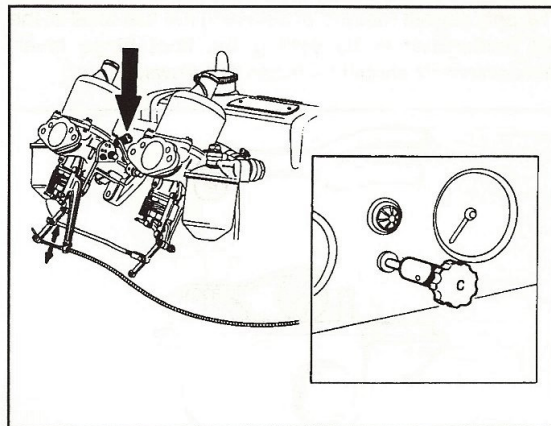
- Check for correct mixture by gently pushing the lifting pin of the front carburetter up 0.8 mm (1/32 in). See page 15 for the possible effect on engine r.p.m.
- Repeat the operation on the rear carburetter and after adjustment re-check the front carburetter since the two are interdependent.
- Page 15 shows the correct type of exhaust smoke.

H Type Carburettor: Tuning (Multi-Carbs)



5

- (a) Tighten the clamp bolt of the throttle spindle interconnections and set the link pin lever with the pin resting against the edge of the pick-up lever hole (see inset). This provides the correct delay in opening the front carburettor throttle disc.
- (b) Re-connect the jet control linkage, so that both jets commence to move simultaneously.



6

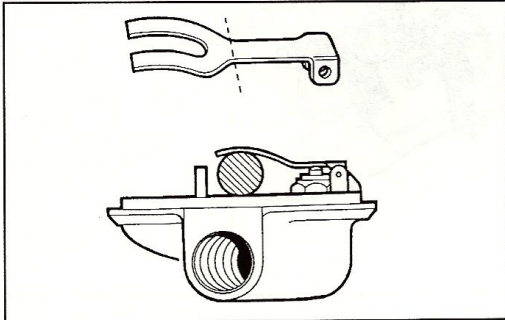
- (a) Reconnect the mixture control wire with about 1.6 mm (1/16 in) free movement before it starts to pull on the jet levers.
- (b) Pull the mixture control knob until the linkage is about to move the carburettor jets, and adjust the fast-idle screw to give an engine speed of about 1,000 to 1,200 r.p.m. when hot.
- (c) Refit the air cleaners and re-check for correct mixture as described in item 4.

Fault Diagnosis

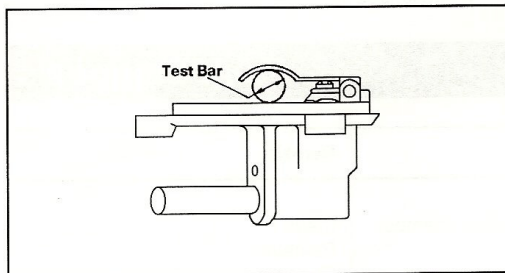
Symptom	Cause	Remedy
Erratic running Stalling at idling Lack of power High fuel consumption	Sticking piston: Dirty piston and suction chamber Jet out of centre Bent needle	Clean Re-centre Fit new
Too rich at idling Fuel leak	Jet gland leakage: Faulty top gland Dirt under top gland washer Faulty bottom gland	Fit new Clean Fit new
Float chamber or jet flooding	Incorrect fuel level Dirty or worn float chamber needle valve Punctured float	Check and reset level Clean or renew valve Fit new

Float Chamber Fuel Levels

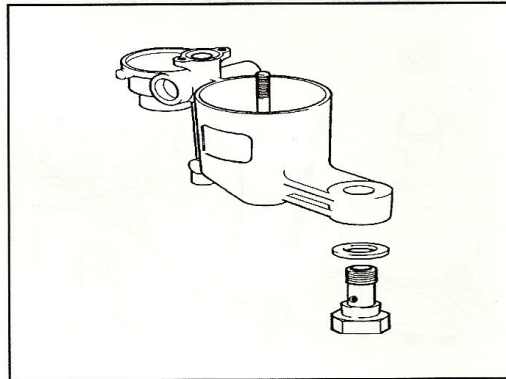
The only correct method of adjusting the fuel level of the SU carburettor is by setting the float hinge lever. Measurements should be made as follows.



For float chambers for T1 (1 7/8" outside diameter) and T2 (2 1/4" outside diameter) this should be such that, with the float chamber lid inverted and the hinge lever resting on the float needle, it is just possible to slide a test bar 7/16" in diameter between the radius of the hinge lever and the face of the float chamber lid register. For float chambers for T4 (3" outside diameter) a test bar 5/8" in diameter should be used.

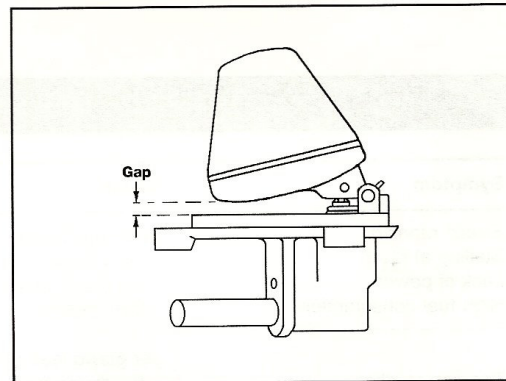


For the HS type with a brass float, a test bar 5/16" in diameter is used as above.



For the HS type with an early type nylon float and steel needle, the gap between the lever and the face should be between 0.125" and 0.187".

For the float chamber with the delrin needle (spring loaded) and new geometry float and lid, the gap should also be between 0.125" and 0.187" with the float arm resting on the needle plunger but not depressing it.



For the float chamber with the delrin needle and the later all nylon float assembly, the gap should be between 0.062" and 0.187" with the float arm resting on the needle plunger but not depressing it. This type is not adjustable.

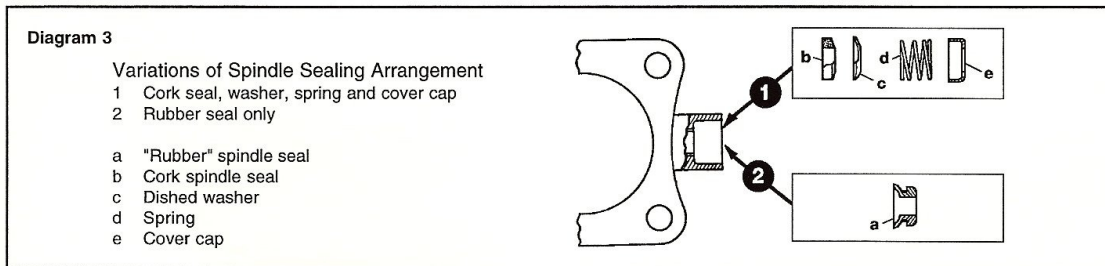
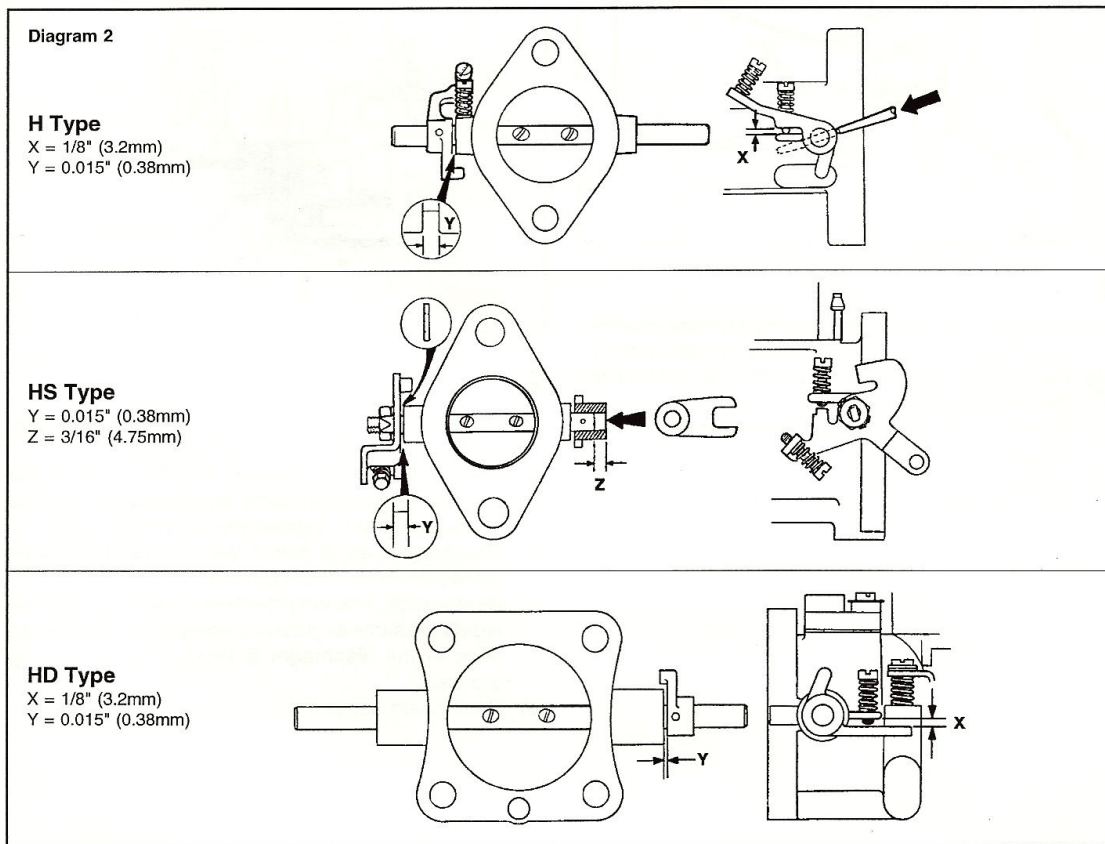
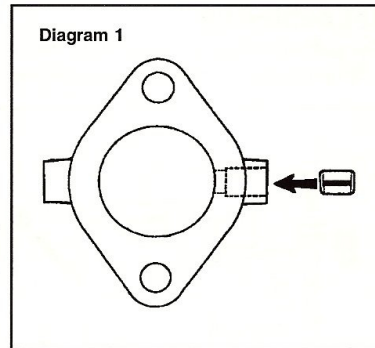
Replacement of Spindles and Spindle Bushes

If new bushes are required, we recommend the fitment of the modern teflon-coated steel backed type as supplied in our kits.

The body needs to be bored out in line to 8mm (1/4" diameter spindle) or 9.5mm (5/16" diameter spindle). This is best achieved in a lathe. For best results, the depth of the bore should be limited to the length of the bush as shown in diagram 1, and not right through into the venturi. The bushes can then be pushed in until flush with the throttle body using special tool **ABF 185** shown on page 25.

On some SU types, the throttle stops and levers are held in place by a taper pin. Diagram 2 shows the clearances required on these various types. NOTE: The throttle disc must be held firmly closed when setting these clearances and whilst drilling the stops.

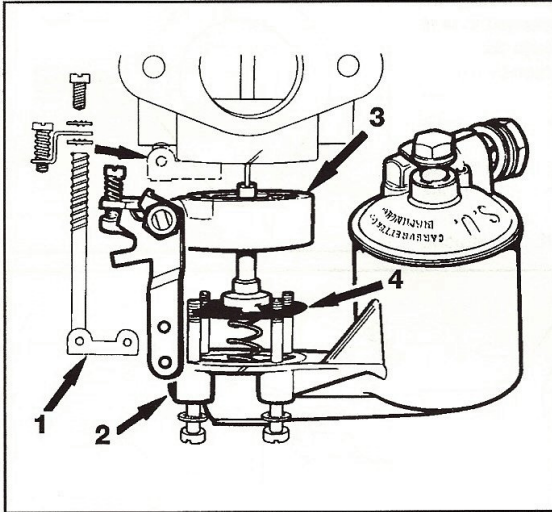
Some HD types had P.T.F.E. bushes. These are now obsolete and should be replaced as described above. The spindle sealing arrangements on HD types have changed from time to time and may be fitted with cork seal, cup washer, spring and cap, or just a rubber lip seal. Diagram 3 indicates the correct method of fitment.



HD Type Carburettor: Routine Servicing

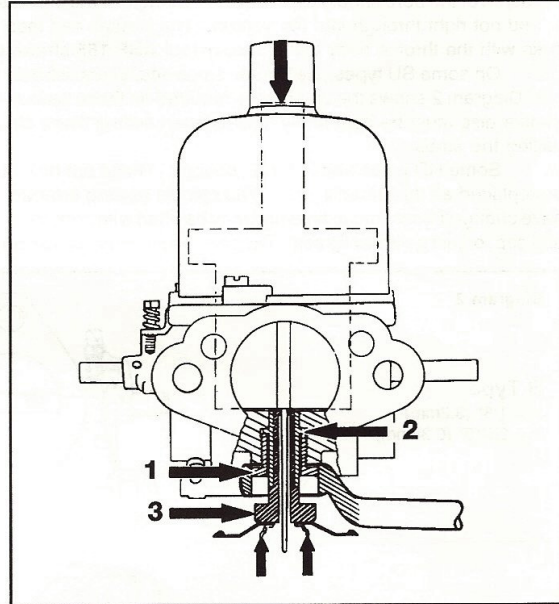
Jet centering

The piston should fall freely onto the carburettor bridge with a click when the lifting pin is released with the jet in the fully up position. If it will only do this with the jet lowered then the jet unit requires re-centring. This is done as follows:



1

- Mark the position of the jet housing and float-chamber in relation to the carburettor body for reassembly.
- Remove the plate retaining screw and withdraw the cam rod assembly (1).
- Unscrew and remove the float-chamber securing screws.
- Remove the float-chamber (2) and the jet housing (3) and then release the jet assembly (4).

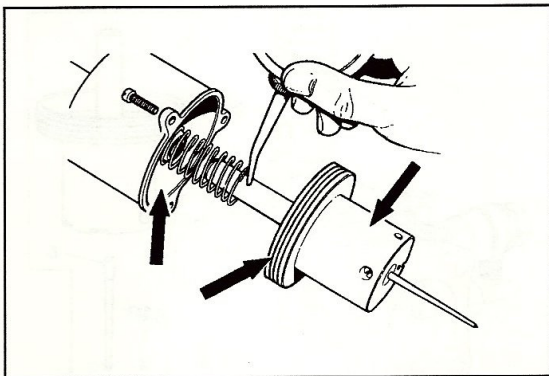


2

- Slacken the jet locking nut (1), using a ring spanner, until the jet bearing (2) is just free to move.
- Remove the piston damper, hold the jet (3) in the 'fully up' position and apply light pressure to the top of the piston rod. Tighten the jet locking nut (1).
- Check again as in item 1 and ensure that the jet moves down the bearing freely.
- Reassemble, ensuring that the jet and diaphragm are kept to the same angular position and that the beaded edge of the diaphragm is located in the housing groove.
- Refill piston damper with oil (see tuning section).

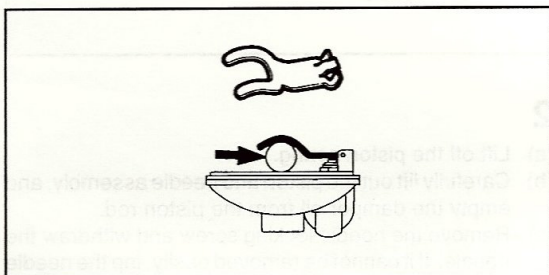
H Type Carburettor: Routine Servicing

Cleaning



- Remove the piston/suction chamber unit.
- Using a petrol-moistened cloth, clean the inside bore of the suction chamber and the two diameters of the piston.
- Lightly oil piston rod only and reassemble.

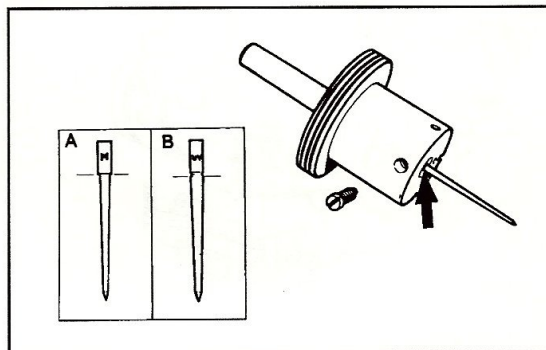
Float chamber fuel level



- Remove and invert the float-chamber lid.
- With the needle on its seating, insert a 11.0 mm (7/16 in) diameter bar between the forked lever and the lip of the float-chamber lid.
- The prongs of the lever should just rest on the bar. If they do not, carefully bend at the start of the pronged section until they do.

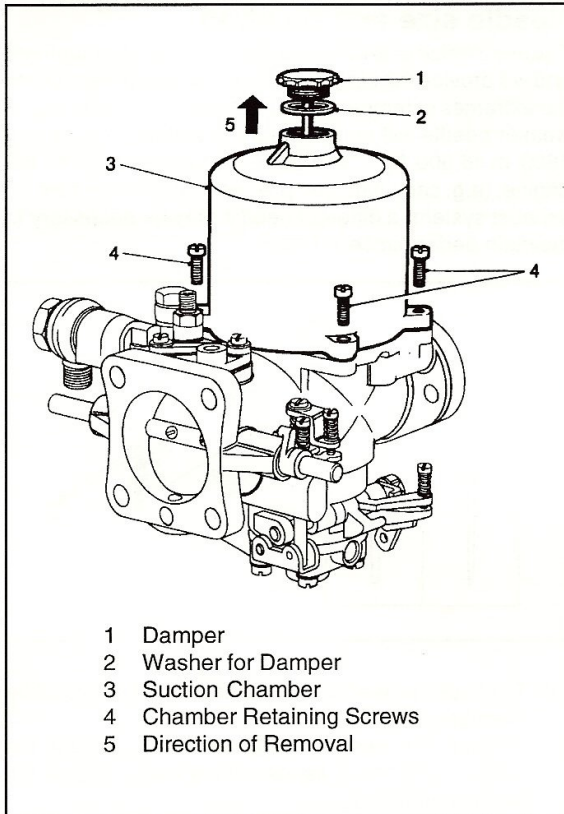
Needle size and position

The needle size is determined during engine development and will provide the correct mixture strength except under the extremes of temperature, humidity, or altitude; e.g. a weaker needle will be necessary at altitudes exceeding 1800 m (6,000 ft). If modifications are made to the engine; (e.g. camshaft, compression ratio, air cleaner, or exhaust system) a different needle may be necessary to maintain performance.



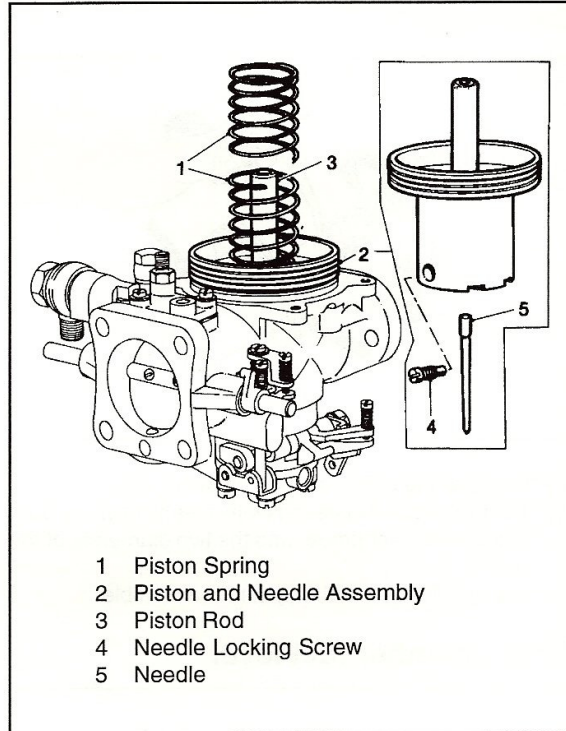
- To check the needle fitted, remove the piston/suction chamber unit.
- Slacken the needle clamping screw, extract the needle, and check its identifying mark against the recommendation.
- Fit the correct needle and lock it in position so that the shoulder on the shank (A), or the lower edge of the groove (B), is flush with the piston base.
- Reassemble the piston/suction chamber unit.

HD Type Carburetter: Dismantling



1

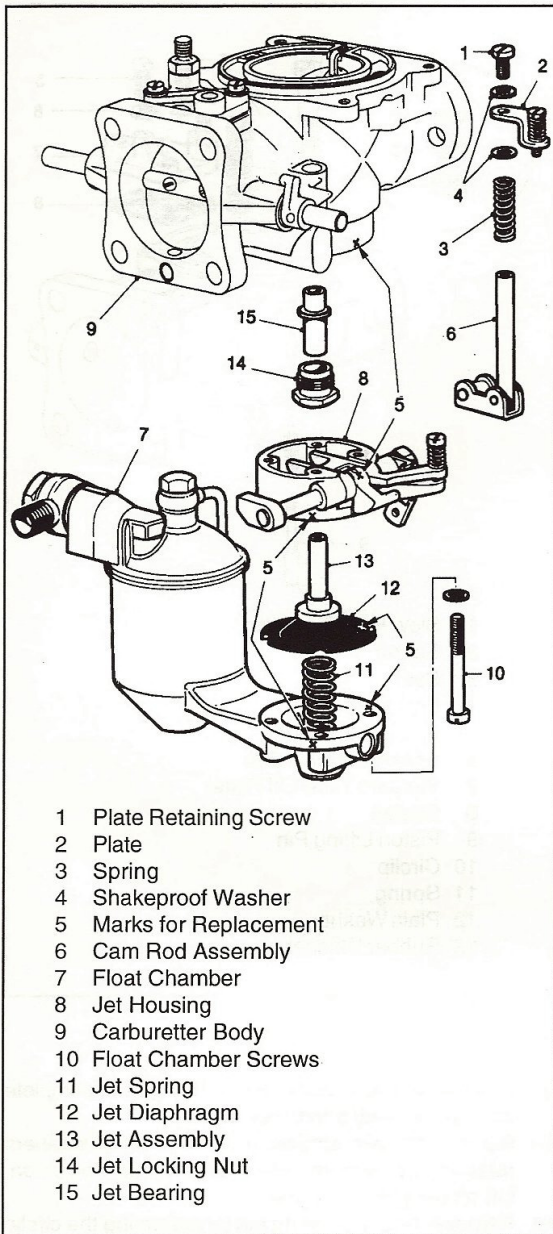
- Thoroughly clean the outside of the carburetter.
- Unscrew and remove the damper and washer.
- Remove the suction chamber retaining screws and remove the chamber without tilting it.



2

- Lift off the piston spring.
- Carefully lift out the piston and needle assembly, and empty the damper oil from the piston rod.
- Remove the needle locking screw and withdraw the needle. If it cannot be removed easily, tap the needle inwards first and then pull outwards. Do not bend the needle.

H Type Carburettor: Dismantling

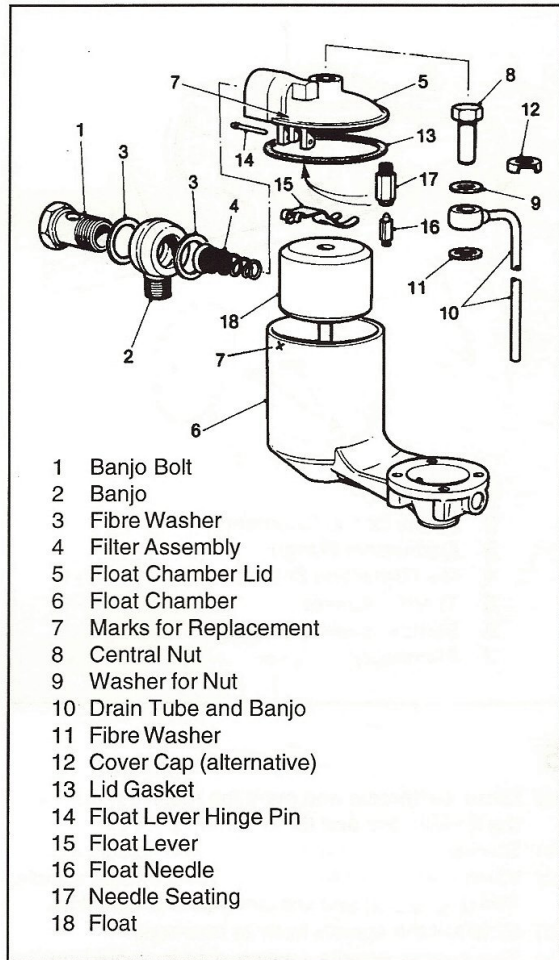


3

- Remove the plate retaining screw and lift off the plate and spring, noting the shake proof washer either side of the plate. Withdraw the cam rod assembly.
- Mark the relative positions of the float chamber, jet housing and carburettor body. Unscrew the float-chamber screws, holding the float-chamber against

the pressure of the jet spring, then detach the float chamber carefully.

- Lift out the jet spring. Mark the jet diaphragm opposite one of the screw holes in the jet housing and withdraw the jet assembly, then lift off the jet housing.
- Using a ring spanner, slacken and remove the jet locking nut together with the jet bearing.

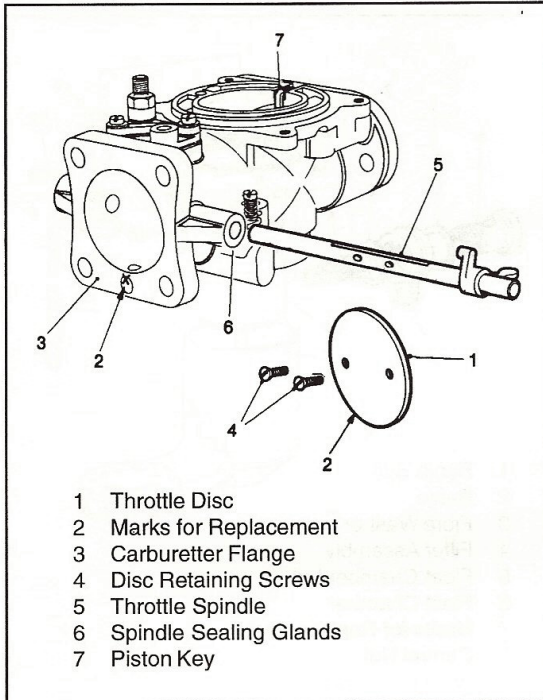


4

- Unscrew the banjo bolt and remove the bolt, banjo, and fibre washers. Extract the filter and spring assembly from inside the float-chamber lid inlet.
- Mark the relative positions of the float chamber and lid. Remove the central nut retaining the float-chamber lid together with the drain-tube banjo and fibre washer, or cover cap, if fitted.

HD Type Carburettor: Dismantling

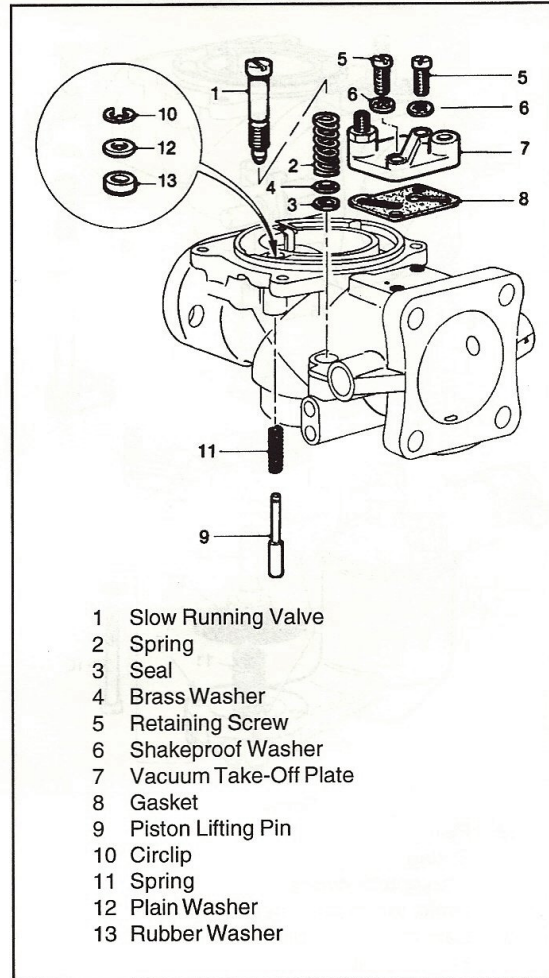
- (c) Detach the lid and gasket. Push out the float lever hinge pin from the end opposite to the serrations, then detach the lever.
- (d) Extract the float needle from its seating and unscrew the seating from the lid using a box spanner 8.58 mm (0.338 in) across the flats. Do not distort the seating.
- (e) Invert the chamber to remove the float.



- 1 Throttle Disc
- 2 Marks for Replacement
- 3 Carburettor Flange
- 4 Disc Retaining Screws
- 5 Throttle Spindle
- 6 Spindle Sealing Glands
- 7 Piston Key

5

- (a) Close the throttle and mark the relative positions of the throttle disc and the carburettor flange.
- (b) Slacken and remove the disc retaining screws.
- (c) Withdraw the disc from its slot in the throttle spindle. The disc is oval and will jam if care is not taken.
- (d) Slide out the spindle from its bearings.
- (e) The throttle spindle sealing glands should not be removed as they require no servicing.



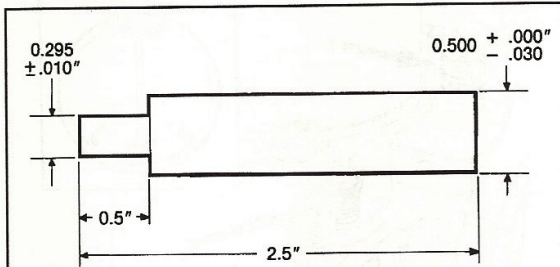
- 1 Slow Running Valve
- 2 Spring
- 3 Seal
- 4 Brass Washer
- 5 Retaining Screw
- 6 Shakeproof Washer
- 7 Vacuum Take-Off Plate
- 8 Gasket
- 9 Piston Lifting Pin
- 10 Circlip
- 11 Spring
- 12 Plain Washer
- 13 Rubber Washer

6

- (a) Unscrew and remove the slow-running valve complete with spring, seal and brass washer.
- (b) Remove the two screws and shake proof washers retaining the vacuum ignition takeoff plate and union. Lift off the plate and gasket.
- (c) Remove the piston lifting pin by extracting the circlip from its groove with the pin pressed upwards, then withdraw the pin downwards.

H Type Carburetter: Reassembly

Throttle Spindle Bush Replacement



Throttle spindle bush replacement should be undertaken as follows. Note: some HD8 carburetters are fitted with plastic spindle bushes which are now no longer available.

- 1 Dismantle the carburetter as described. Remove P.T.F.E. bushes from carburetter body where fitted.
- 2 Line ream throttle spindle bores using a 9.5 mm diameter reamer. Finished bore size should be 9.5 mm in diameter (see also page 19).
- 3 Using a service tool shown (part no. **ABF 185**) drive replacement bushes into the body.
- 4 Remove all swarf and burr from the body.
- 5 Reassemble throttle spindle and disc assembly fitting spindle seals supplied in the service kit. Position the seals* so that the sealing face is in contact with the carburetter body.

* See page 19 for further information.

Before reassembling, examine all the components for damage and/or wear. Unserviceable components must be renewed.

1

- (a) Examine the throttle spindle for scoring or signs of wear. Refit the spindle in its bearings and check for slack in the bearings and for freedom of operation. If carburetter body requires rebushing, refer to page 19.
- (b) Refit the throttle disc in the slot of the throttle spindle in the position as marked when dismantling. The countersunk ends of the screw holes in the spindle must face outwards towards the flange of the carburetter body. Insert two new retaining screws but do not tighten.
- (c) Adjust the disc until it closes fully. Check this visually, then tighten the screws. Spread the split ends of the screws just enough to prevent them from turning.

2

- (a) Examine the slow-running valve seal for serviceability. Check that the concave face of the brass washer is towards the seal. Refit the valve assembly.
- (b) Check that the passages in the carburetter body and the vacuum ignition take-off plate are not obstructed. Examine the gasket for re-use and refit the gasket, plate, and securing screws. Tighten securely.
- (c) Refit the piston lifting pin, spring, rubber washer, plain washer and circlip.

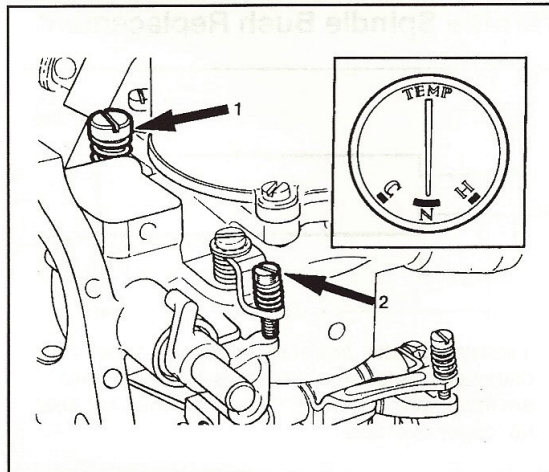
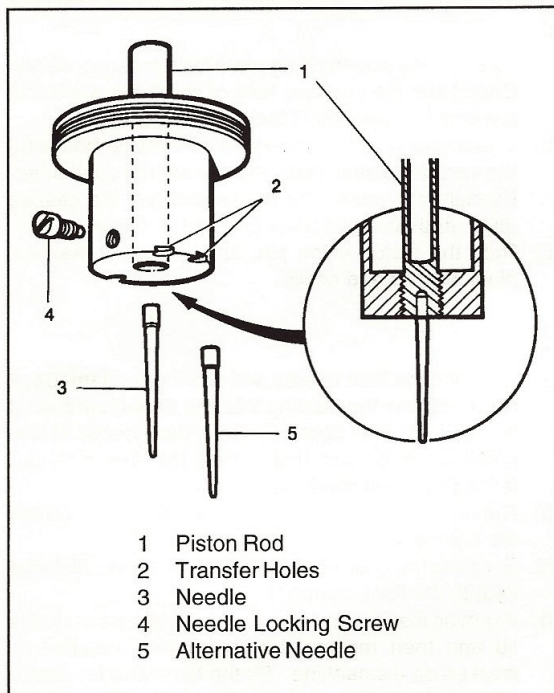
3

- (a) Examine the float needle and seating for damage or wear. Screw the seating into the float-chamber lid but do not over tighten. Refit the needle to the seating, coned-end first. Test the assembly for leakage with air pressure.
- (b) Refit the float lever and insert the hinge pin. Check the float level as described on page 21.
- (c) Examine the float for damage or punctures. Refit the float to the float-chamber.
- (d) Examine the lid gasket for re-use. Fit the gasket to the lid and then replace the lid on the chamber as marked on dismantling. Fit the fibre washer, drain-tube banjo, plain washer, and nut or cover cap and nut, as applicable. Do not over tighten the nut.
- (e) Clean the filter assembly and examine for damage. Refit the filter to the lid inlet, spring end first. Refit the banjo, fibre washers and banjo bolt. The recessed face of the banjo must be towards the hexagon of the bolt.

4

- (a) Examine the piston assembly for damage to the piston rod and the outside surface of the piston. The piston assembly must be scrupulously clean. Use either petrol or methylated spirits as a cleaning agent. Do not use abrasives. Lightly oil the outside of the piston rod.
- (b) Clean inside the suction chamber and piston rod guide using petrol or methylated spirits. Refit the damper assembly and washer. Seal the transfer holes in the piston assembly with rubber plugs or Plasticine and fit the assembly to the suction chamber. Invert the complete assembly and allow the suction chamber to fall away from the piston. This operation should take between 5 and 7 seconds. If the time taken is in excess of that quoted the cause will be thick oil on the piston rod or an oil film on the piston or inside the suction chamber. Remove the oil from the points indicated and re-check.

HD Type Carburetter: Reassembly, Tuning (Single Carbs)

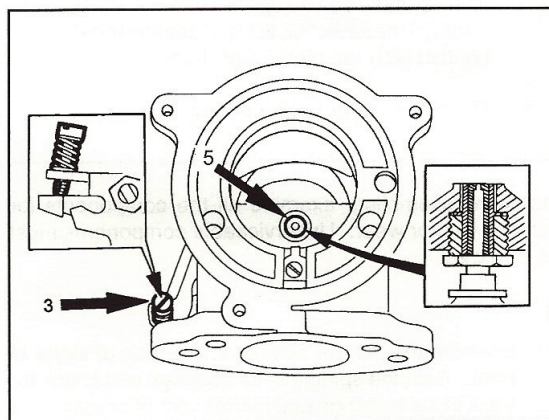


1

- Run the engine up to normal running temperature.
- Switch off the engine.
- Unscrew the fast-idle adjusting screw (2) to clear the throttle stop with the throttle closed.
- Screw down the slow-running valve (1) onto its seating, then unscrew it 3.5 turns.

5

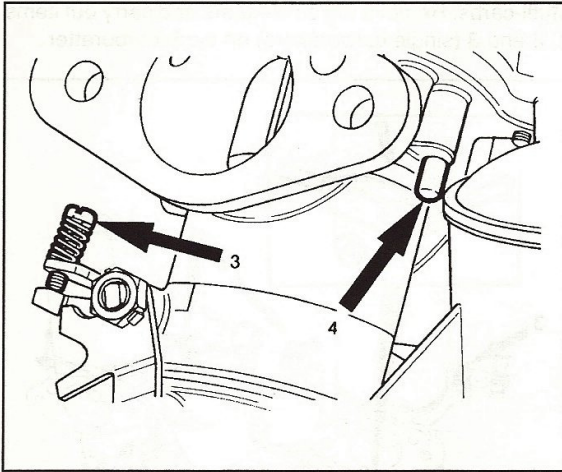
- Refit the jet bearing and jet locking nut. Leave the nut sufficiently slack to allow the bearing to be moved from side to side.
- Fit the jet assembly to the bearing in the same position as marked on dismantling. Centralize the jet as described on page 20.
- Remove the jet and refit the jet housing, jet, jet spring and float-chamber in the same relative positions as marked on dismantling. Fit and tighten the securing screws evenly.
- Replace the cam rod assembly and refit the spring, plate and plate retaining screw with a shake proof washer either side of the plate. Ensure the plate is positioned so that its adjustment screw strikes squarely on the lug of the throttle spindle operating arm.



2

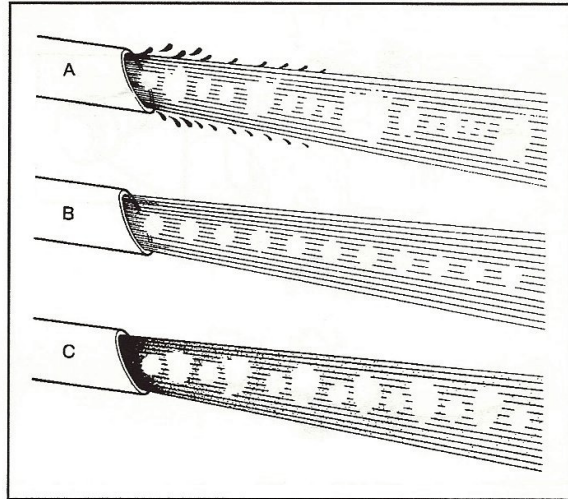
- Remove the piston/suction chamber unit.
- Turn the jet adjusting screw (3) until the jet (5) is flush with the bridge of the carburetter.

H Type Carburettor: Tuning (Single Carbs)



3

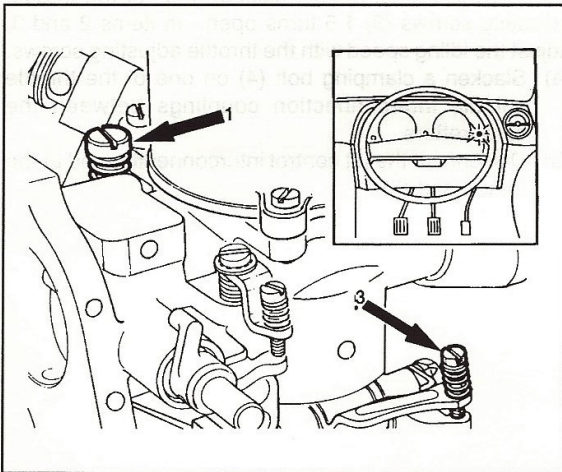
- Replace the piston/suction chamber unit.
- Check that the piston falls freely onto the bridge when the lifting pin (4) is released. If not, see page 183.
- Lower the jet by turning the jet adjusting screw (3) down 2.5 turns.



5

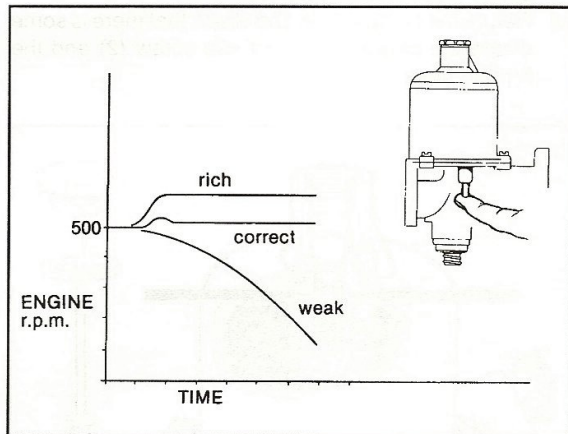
The effect of mixture strength on exhaust smoke

- TOO WEAK: Irregular note, splashy misfire, and colourless.
- CORRECT: Regular and even note.
- TOO RICH: Regular or rhythmical misfire, blackish.



4

- Restart the engine and adjust the slow running valve (1) to give the desired idling speed.
- Turn the jet adjusting screw (3), up to weaken or down to enrich, until the fastest idling speed consistent with even running is obtained.
- Re-adjust the slow-running valve (1), if necessary, to give correct idling.



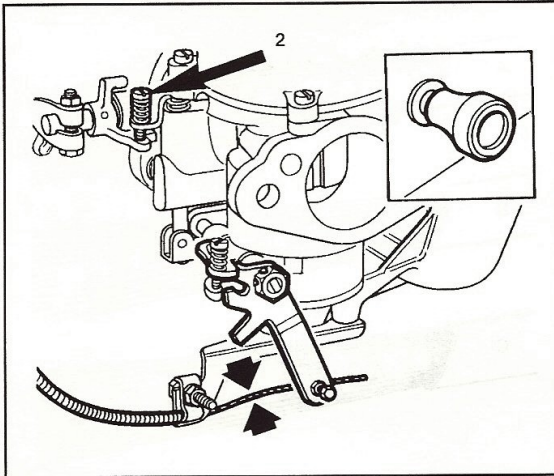
6

- Check for correct mixture by gently pushing the lifting pin (4) up about 0.8 mm (1/32 in) after free movement has been taken up.
- The graph illustrates the effect on engine r.p.m. and indicated mixture strength when the piston is raised.

RICH MIXTURE: r.p.m. increase considerably.
CORRECT MIXTURE: r.p.m. increase very slightly.
WEAK MIXTURE: r.p.m. immediately decrease.

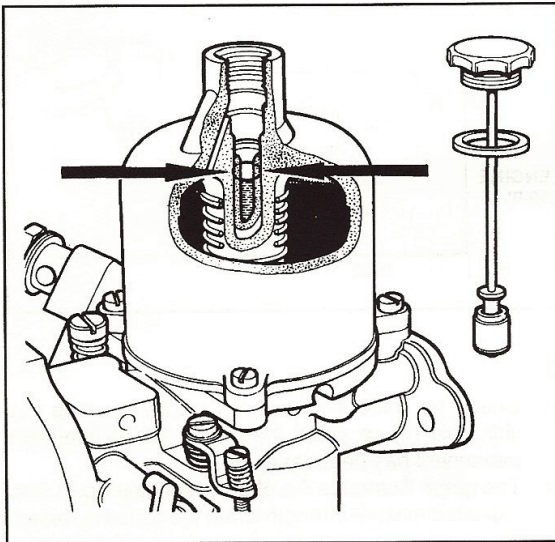
- Re-adjust the mixture strength if necessary.

HD Type Carburetter: Tuning (Single, Multi-Carbs)



7

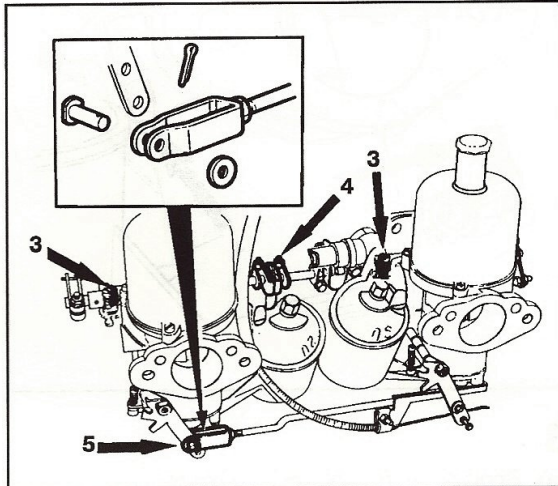
- Reconnect the mixture control wire with about 1.6 mm (1/16 in) free movement before it starts to pull on the jet lever.
- Pull the mixture control knob until the linkage is about to move the carburetter jet operating arm and adjust the fast-idle screw (2) to give an engine speed of about 1,000 r.p.m. when hot.
- Return the control knob and check that there is some clearance between the fast idle screw (2) and the throttle stop.



8

Finally top up the piston damper with thin engine oil of grade S.A.E. 20 until the level is 12.7 mm (1/2 in) below the top of the hollow piston rod.

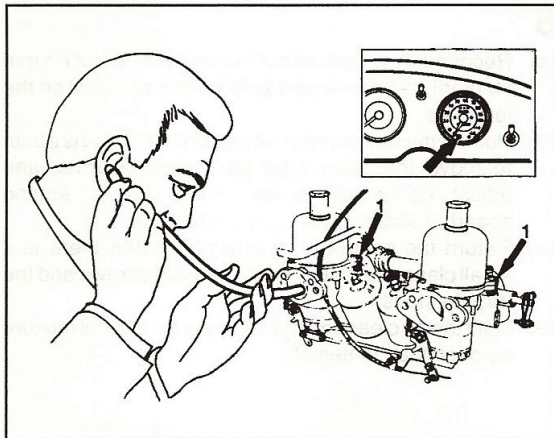
Multi-carbs: Remove the air cleaners and carry out items 1, 2 and 3 (single carburetters) on each carburetter.



1

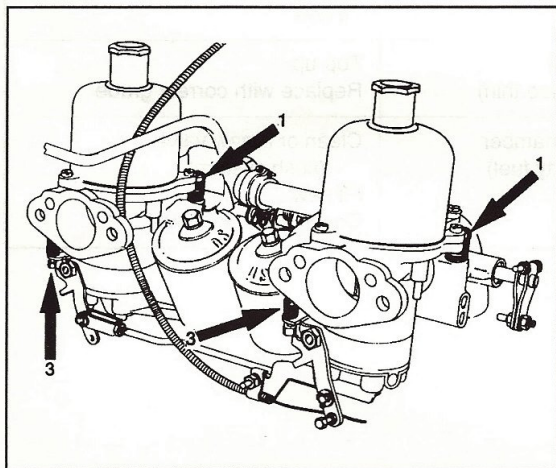
- Note: Whenever the throttle adjusting screws (3) are fitted they, and not the slow-running valves, must be used to adjust the idling speed. Screw down the slow-running valves (which must remain closed) and set the throttle adjusting screws (3) 1.5 turns open. In items 2 and 3, adjust the idling speed with the throttle adjusting screws.
- Slacken a clamping bolt (4) on one of the throttle spindle interconnection couplings between the carburetters.
 - Disconnect the jet control interconnecting rod at the forked end (5).

H Type Carburetter: Tuning (Multi-Carbs)



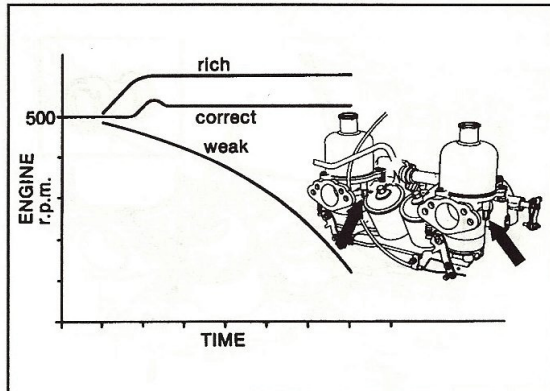
2

- Restart the engine and turn the slow-running valve (1), or the throttle adjusting screw, an equal amount on each carburetter to give the desired idling speed.
- Compare the intensity of the intake hiss on all carburetters and alter the slow-running valves (1), or throttle adjusting screws, until each hiss is the same.



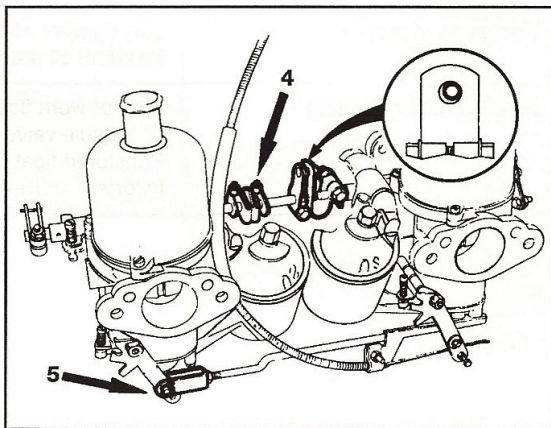
3

- Turn the jet adjusting screw (3) an equal amount on all carburetters, up to weaken or down to enrich, until the fastest idling speed consistent with even running is obtained.
- Re-adjust the slow-running valves (1), if necessary.



4

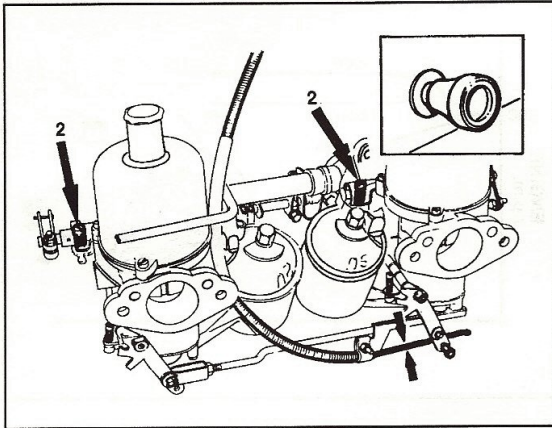
- Check the mixture by raising the lifting pin (4) of the front carburetter 0.8 mm (1/32 in) after free movement has been taken up. The graph illustrates the possible effect on engine r.p.m.
- Repeat the operation on the other carburetter(s) and after adjustment re-check as the carburetters are interdependent.
- Page 27 shows the effect of mixture on the exhaust smoke.



5

- Tighten the clamp bolt (4) of the throttle spindle interconnections with the pin of the link pin lever resting against the edge of the pick-up lever hole (see inset). This provides the correct delay in opening the front carburetter throttle. When forked levers are fitted, set the cranked levers so that the pin is 0.15 mm (0.006 in) from the lower edge of the fork.
- Reconnect the jet control linkage (5) so that the jet operating arms move simultaneously; if necessary, turn the fork end(s).

HD Type Carburettor: Tuning (Multi-Carbs)



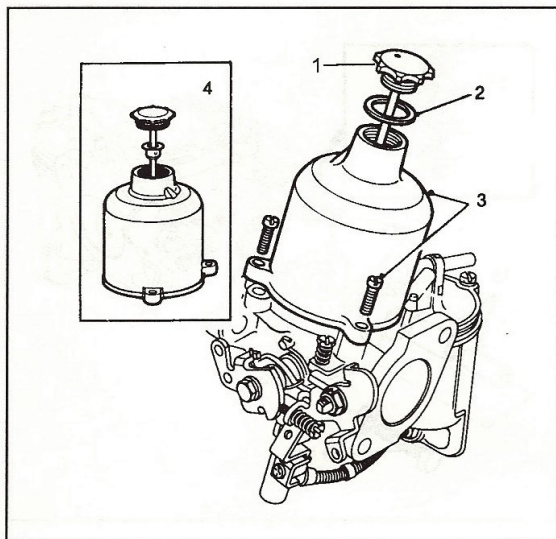
6

- Reconnect the mixture control wire with about 1.6 mm (1/16 in) free movement before it starts to pull on the jet levers.
- Pull the mixture control knob until the linkage is about to move the carburettor jet operating arms, and adjust the fast-idle screws (2) to give an engine speed of about 1,000 r.p.m. when hot.
- Return the control knob and check that there is a small clearance between the fast idle screws and the throttle stops.
- Refit the air cleaners and re-check for correct mixture as described in item 4.

Fault Diagnosis

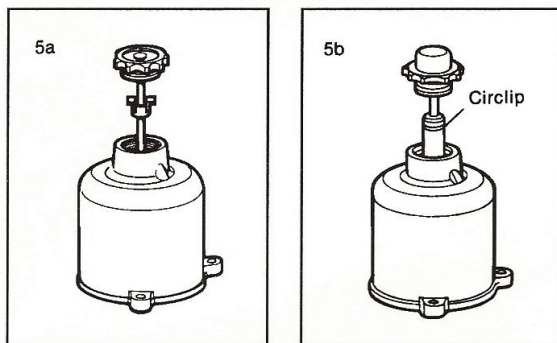
Symptom	Cause	Remedy
Erratic running Stalling at idling Lack of power High fuel consumption	Sticking piston: Dirty piston and suction chamber Jet out of centre Bent needle	Clean Re-centre Fit new
Hesitation at pick-up	Low damper oil level Incorrect oil grade (too thin)	Top up Replace with correct grade
Float chamber flooding	Dirty or worn float-chamber needle valve (dirty fuel) Punctured float Incorrect fuel level	Clean or renew valve (flush system) Fit new Check and reset level

HS2, HS4 and HS6 Carburetter: Dismantling



1

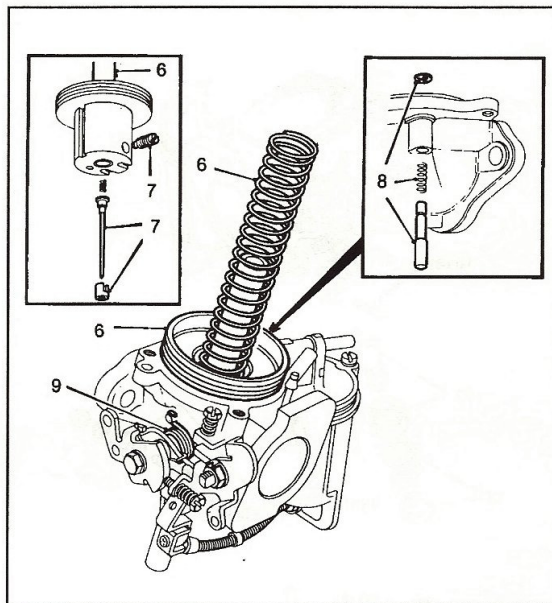
- (a) Thoroughly clean the outside of the carburetters.
- (b) Standard suction chambers. Remove the piston damper (1) and its washer (2), if fitted.
- (c) Unscrew the suction chamber retaining screws (3).
- (d) Lift the chamber assembly (4) vertically from the body without tilting it.



2

Ball bearing suction chambers (early type). Hold the piston firmly and pull the suction chamber, taking care not to bend the damper rod, until the bearing retainer is freed from the piston rod (5a). Remove the damper.

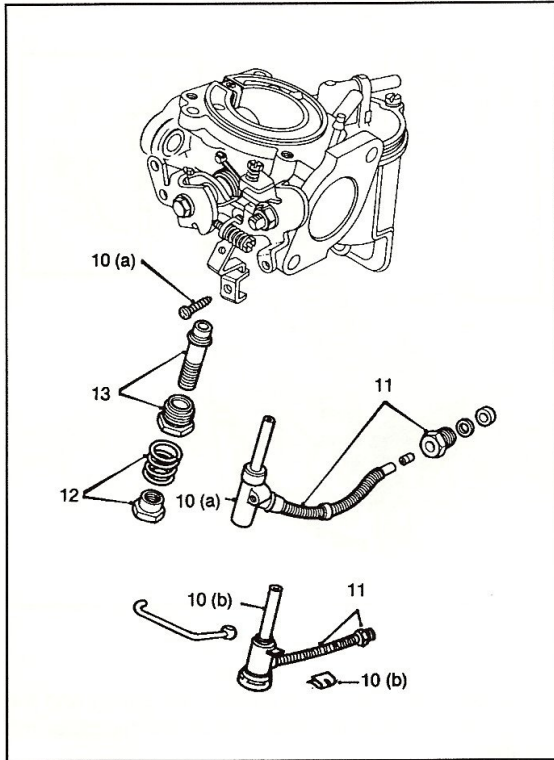
Ball bearing suction chambers (later type). Remove the piston damper. Lift the piston and remove the bearing retaining circlip (5b).



3

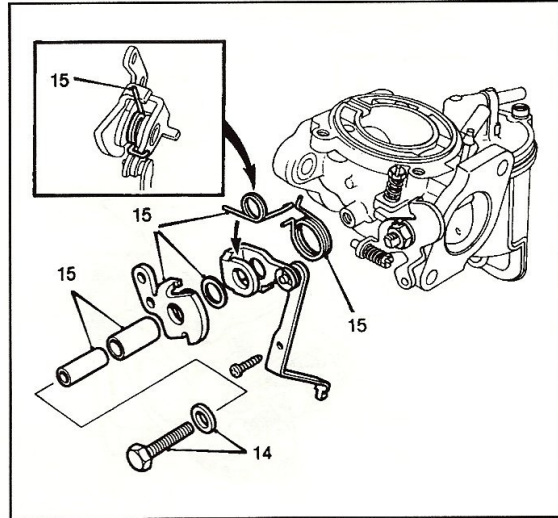
- (a) Separate the suction chamber, the spring and the piston assembly and empty the oil from the piston rod (6).
- (b) Unscrew the needle guide locking screw, then withdraw the needle, guide and spring (7). For fixed needle HS carburetters, refer to pages 7-8 for needle fitment and jet centering.
- (c) Remove the piston lifting pin circlip and spring and withdraw the pin from the body (8).
- (d) Release the pick-up lever return spring from its retaining lug (9).

HS2, HS4 and HS6 Carburetter: Dismantling



4

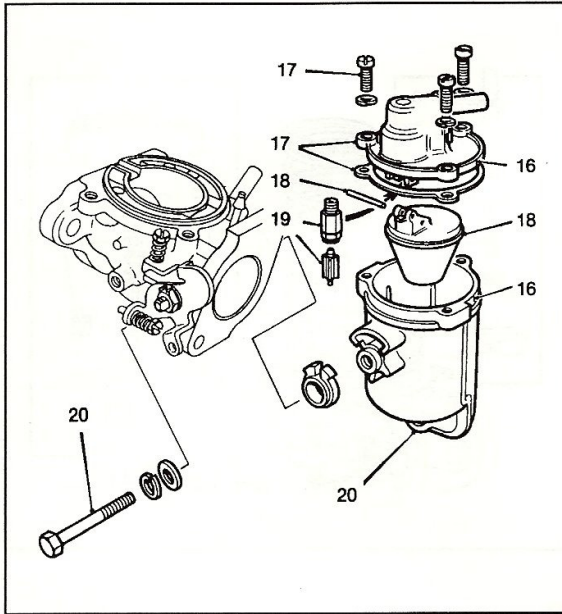
- (a) **Standard jet.** Support the plastic moulded base of the jet and remove the screw retaining the jet pick-up lever and link bracket (when fitted) (10a).
Capstat jet. Remove the clip holding the wire link to the jet housing (10b).
- (b) Unscrew the jet tube sleeve nut from the float-chamber and withdraw the jet assembly (11). Note the gland, washer and ferrule at the end of the jet tube.
- (c) Remove the jet adjusting nut and spring (12).
- (d) Unscrew the jet locking nut and detach the nut and jet bearing, withdraw the bearing from the nut (13).



5

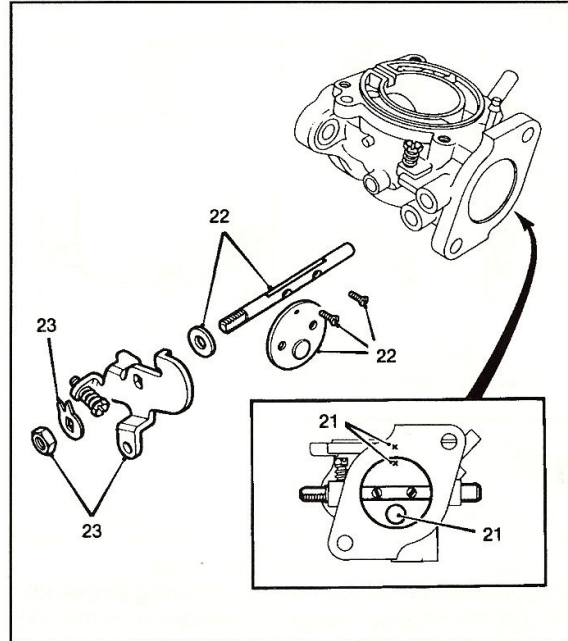
- (a) Unscrew and remove the lever pivot bolt and distance washer (14).
- (b) Detach the cam lever assembly and return springs, noting the pivot bolt tubes, skid washer and the locations of the cam and pick-up lever springs (15).

HS2, HS4 and HS6 Carburetter: Dismantling



6

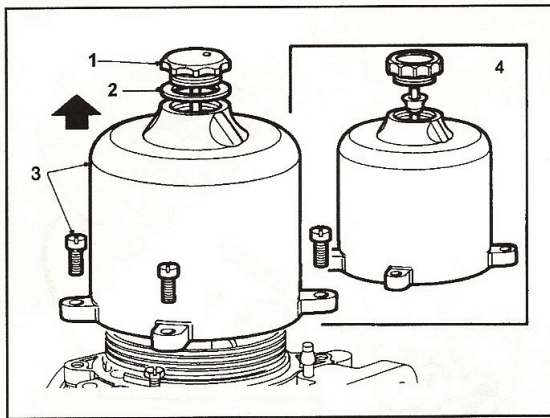
- Mark the float-chamber lid location to facilitate accurate reassembly (16).
- Remove the lid securing screws and detach the lid with its joint washer and float (17).
- Hold the float hinge pin at its serrated end and withdraw the pin and float (18).
- Extract the float needle from its seating and unscrew the seating from the lid (19).
- Remove the float-chamber securing bolt and the chamber (20).



7

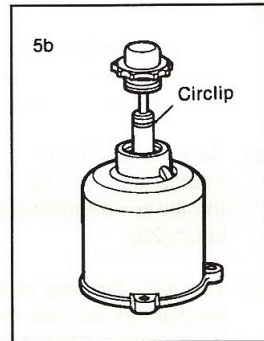
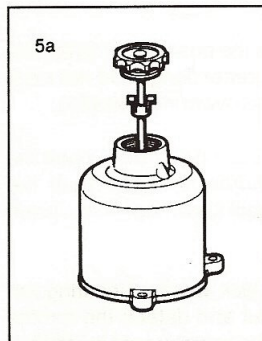
- Close the throttle and mark the position of the throttle disc in relation to the carburetter flange. Do not mark the disc in the vicinity of the overrun valve (21).
- Remove the throttle disc retaining screws, open the throttle and carefully withdraw the disc from the throttle spindle taking care not to damage the overrun valve (22).
- Tap back the tabs of the lock washer securing the spindle nut, remove the nut and detach the throttle lever, washer and the throttle spindle; note location of the lever in relation to the spindle and carburetter body (23).

HS4C and HS8 Carburetter: Dismantling



1

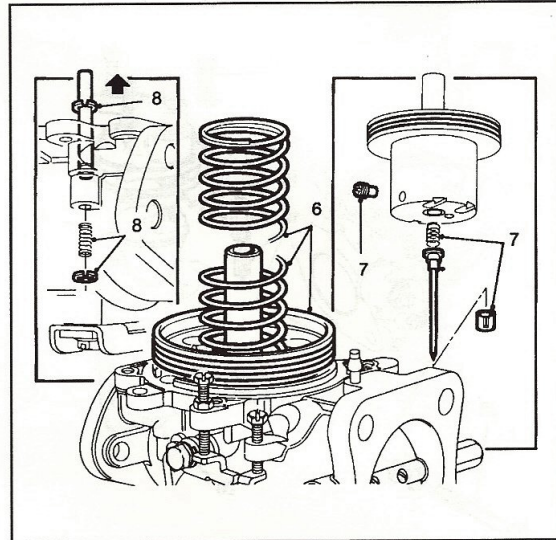
- Thoroughly clean the outside of the carburetter.
- Standard suction chambers.** Remove the piston damper (1) and its washer (2), if fitted.
- Unscrew the suction chamber retaining screws (3).
- Lift the chamber assembly vertically from the body without tilting it (4).



2

Ball bearing suction chambers (early type). Hold the piston firmly and pull the suction chamber, taking care not to bend the damper rod, until the bearing retainer is freed from the piston rod (5a). Remove the damper.

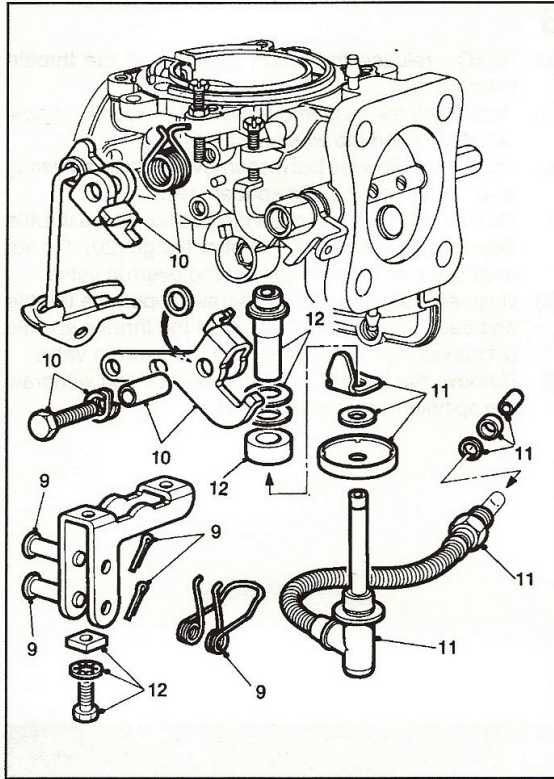
Ball bearing suction chambers (later type). Remove the piston damper. Lift the piston and remove the bearing retaining circlip (5b). Note: ball bearing suction chambers are not available for HS8 carburetters.



3

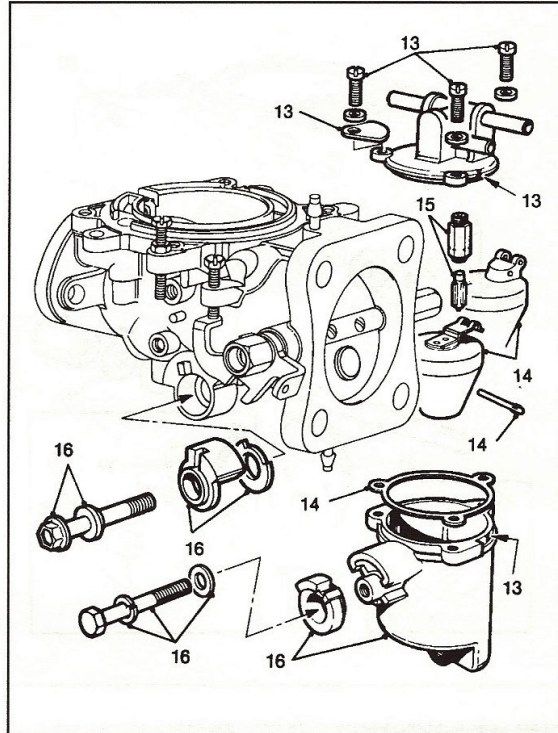
- Separate the suction chamber, the spring and the piston assembly and empty the oil from the piston rod (6).
- Unscrew the needle guide locking screw, then withdraw the needle, guide and spring (7).
- Remove the piston lifting pin circlip and spring, withdraw the pin from the body (8).

HS4C and HS8 Carburettor: Dismantling



4

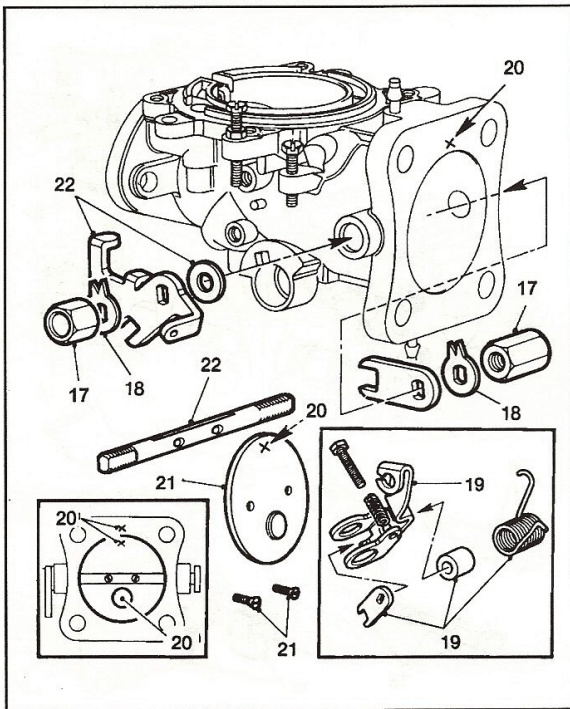
- (a) Remove the split pins retaining the jet spring anchor pin and jet fork pivot pin. Remove the pins, spring and jet fork from the bracket (9).
- (b) Release the cam lever return spring from its lug, remove the bolt, washers, cam lever, bush and link arm assembly (10).
- (c) Unscrew the jet tube sleeve nut from the float chamber and withdraw the jet assembly complete with centring washer, copper washer and ferrule at the end of the jet tube (11).
- (d) Remove the bolts, starlock washers and spacers securing the fork bracket to the carburettor body and withdraw the jet bearing together with the bush and Belleville washers (12).



5

- (a) Mark the relative position of the float lid and chamber, remove the float lid retaining screws, washers and identification tag (13).
- (b) Remove the float lid and gasket, withdraw the float hinge pin and remove the float (14).
- (c) Withdraw the float needle and unscrew the needle seat (15).
- (d) Remove the float chamber securing bolt, float chamber and metal spacer or rubber mounting and backing washer (16).

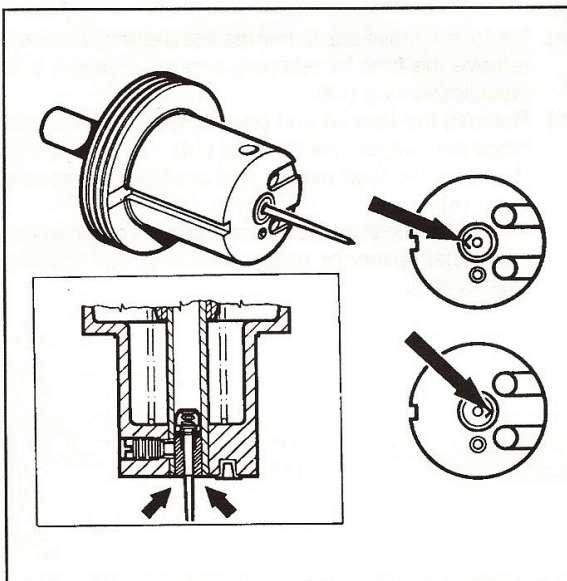
HS4C and HS8 Carburetter: Dismantling



6

- HS4C - release the return spring from the throttle lever.
- Bend back the tabs and remove the throttle spindle nut(s) (17) and tab washer(s) (18).
- HS4C - withdraw the lost motion lever, throttle actuating lever, return spring and spacer (19).
- Close the throttle and mark the position of the throttle disc in relation to the carburetter flange (20). Do not mark the disc in the vicinity of the overrun valve.
- Unscrew the disc retaining screws, open the throttle and ease the disc from its slot in the throttle spindle (21) taking care not to damage the overrun valve.
- Remove the throttle lever and washer and withdraw the spindle from the body (22).

HS Type Carburetter: Reassembly



After inspection (see following page), reassemble by reversing the procedure used to dismantle the carburetter, noting the following:

- Ensure that the throttle disc is fitted in its original position.
- New throttle disc retaining screws must be used when refitting the disc. Ensure that the throttle disc is correctly positioned and closes correctly before tightening the retaining screws. Spread the split ends of the screws sufficiently to prevent turning.
- Use a new retaining screw and a new needle guide ensuring that the needle guide fitted gives the needle bias in the required sense (either toward throttle disc or toward air cleaner). Before tightening the retaining screw check that the needle guide is in its correct position relative to the piston face, either flush with the bottom of the piston on standard pistons or flush with the recess on recessed pistons.
- Ball bearing suction chambers.** To prevent the piston spring from being 'wound up' during reassembly, temporarily fit the piston and suction chamber, less the piston spring, to the body and pencil mark their relative positions to each other. Fit the spring to the piston, hold the suction chamber above the piston, align the pencil marks and lower the chamber over the spring and piston. It is essential that the bearing retention clip (early type) or the bearing retention circlip (later type) is correctly fitted.

HS Type Carburettor: Inspection

1

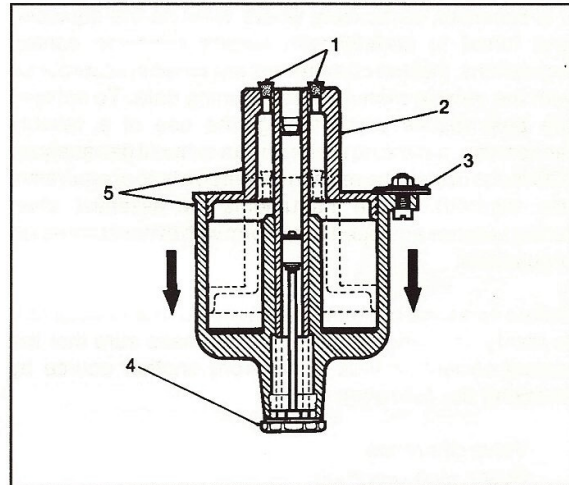
- (a) Examine the throttle spindle and its bearings in the carburettor body; check for any excessive play, and renew any parts as necessary.
- (b) Examine the float needle and seating for any damage and excessive wear; renew if necessary.
- (c) Check condition of all gaskets; renew as necessary.

2

- (a) Examine the carburettor body for cracks and damage, and for security of the brass connections and the piston key.
- (b) Clean the inside of the suction chamber and the piston rod guide with fuel or methylated spirit (denatured alcohol) and wipe dry. Abrasives must not be used.
- (c) Examine the suction chamber and piston for damage and signs of scoring.

3

Ball bearing suction chambers. Check that all the balls are in the piston ball race (2 rows, 6 per row). Fit the piston into the suction chamber, without the damper and spring, hold the assembly in a horizontal position and spin the piston. The piston should spin freely in the suction chamber without any tendency to stick.



4

The following timing check applies only to standard suction chambers and need only be carried out if the cause of the carburettor malfunction which necessitated the dismantling has not been located.

- (a) Temporarily plug the piston transfer holes (1).
- (b) Fit the piston into the chamber without its spring (2).
- (c) Fit a nut and screw, with a large flat washer under the nut, into one of the suction chamber fixing holes, positioning the washer so that it overlaps chamber bore (3).
- (d) Fit the damper and washer, if fitted (4).
- (e) Check that the piston is fully home in the chamber, invert the assembly to allow the chamber to fall away until the piston contacts the washer (5).
- (f) Check the time taken for the chamber to fall the full extent of the piston travel. For carburettors 38.0 mm (1.5 in) to 47.6 mm (1 7/8 in) bore, the time taken should be 5 to 7 seconds.
- (g) If the times are exceeded check the piston and chamber for presence of oil, foreign matter and damage. If after re-checking the time is still not within these limits, renew the suction chamber assembly.

HS Type Carburettor: Tuning (General)

It is essential, particularly where vehicles are equipped and tuned to comply with engine emission control regulations, that the carburetters are tuned in accordance with the vehicle manufacturer's tuning data. To achieve the best results when tuning, the use of a reliable tachometer, balancing meter and an exhaust gas analyzer (CO meter of the infra-red non-dispersive type or equivalent are required). These instruments are essential when tuning vehicles equipped to conform with exhaust emission regulations.

Before servicing or tuning a carburettor in an endeavour to rectify poor engine performance, make sure that the maladjustment or fault is not from another source by checking the following:

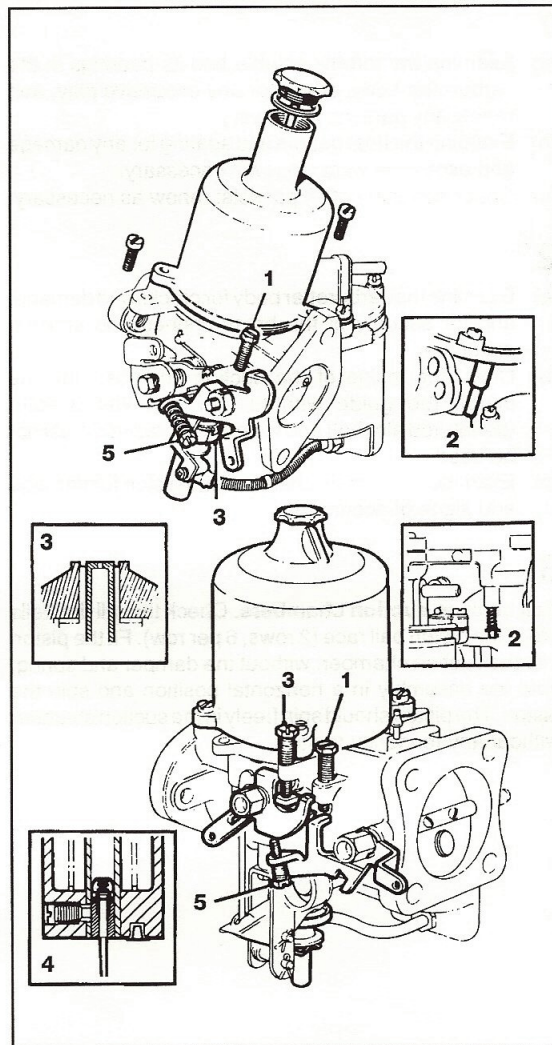
- Valve clearance
- Spark plug condition
- Contact breaker (dwell angle)
- Ignition timing and advance
- Presence of air leaks into the induction system

1

- (a) Remove the air cleaner(s).
- (b) Check the throttle for correct operation and signs of sticking.
- (c) Unscrew the throttle adjusting screw (each screw on multi-carburetters) until it is just clear of the throttle lever with the throttle closed, then turn the screw clockwise 1.5 full turns (single), one turn on each (multicarburetters) (1).
- (d) Raise the piston of each carburettor with the lifting pin (2) and check that it falls freely onto the bridge when the pin is released. If the piston shows any tendency to stick, the carburettor must be serviced.

2

- (a) Lift and support the piston clear of the bridge so that the jet is visible; if this is not possible due to the installed position of the carburettor, remove the suction chamber assembly.
- (b) Turn the jet adjusting nut/screw up/anti-clockwise, until the jet is flush with the bridge or as high as possible without exceeding the bridge height (3). Ensure that the jets on multi-carburetters are in the same relative position to the bridge of their respective carburetters.
- (c) Check that the sintered needle guide is flush with the underside face of the piston (4).
- (d) Turn the jet adjusting nut/screw (3) two turns down/clockwise (each nut/screw on multicarburetters).
- (e) Turn the fast-idle adjusting screw anti-clockwise (each screw multi-carburetters) until it is well clear of the cam (5).

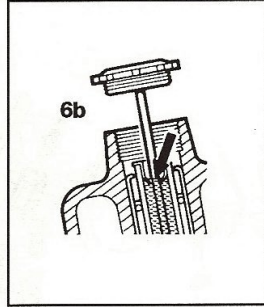
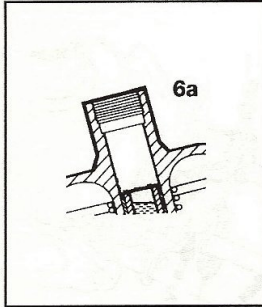


3

Refit the suction chamber assembly if it has been removed and, using the lifting pin (2), check that the piston falls freely onto the bridge.

Note: If ball bearing suction chambers are fitted take care not to wind up the piston spring when refitting the suction chamber - see reassembly section.

HS Type Carburettor: Tuning (General, Single Carbs)



4

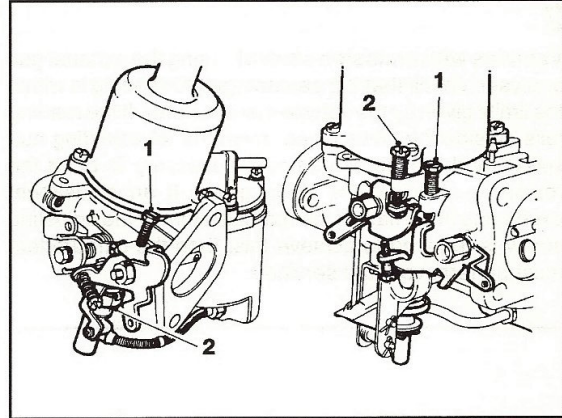
Check the piston damper oil level:

- Standard suction chambers.** Unscrew the cap and withdraw the damper. Top up with engine oil (preferably S.A.E. 20) until the level is just below the top of the hollow piston rod, refit the damper and screw the cap firmly into the suction chamber (6a).
- Ball bearing suction chambers (early type).** Unscrew the cap and raise the piston and damper to the top of their travel. Fill the recess in the damper retainer with engine oil (preferably S.A.E. 20), lower the damper until the cap contacts the suction chamber, repeat this procedure until the oil level is just visible at the bottom of the retainer recess. Screw the cap firmly into the suction chamber. It is essential that the bearing retainer is not displaced from its position in the piston rod (6b).
- Ball bearing suction chambers (later type).** Unscrew the damper cap and withdraw the damper. Top up with engine oil (preferably S.A.E. 20) to within 6.5 mm (0.25 in) of the top of the hollow piston rod. Refit the damper and screw in firmly.

5

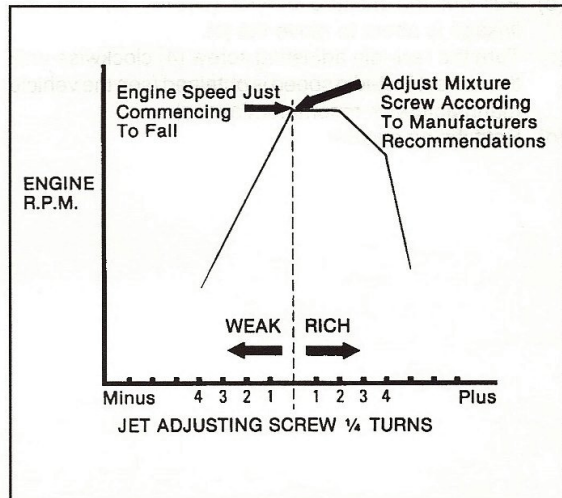
- Vehicles with emission control.** Connect a reliable tachometer to the engine in accordance with the instrument manufacturer's instructions.
- Start the engine and run it at a fast-idle speed until it attains normal running temperature, then run it for a further five minutes.
- Increase the engine speed to 2,500 r.p.m. for 30 seconds.
- Vehicles with emission control.** Connect an exhaust gas analyser to the engine in accordance with the instrument manufacturer's instructions.

Setting can now commence. If the correct setting cannot be obtained within three minutes, increase the engine speed to 2,500 r.p.m. for 30 seconds and then re-commence tuning. Repeat this clearing operation at three-minute intervals until tuning is completed.



1

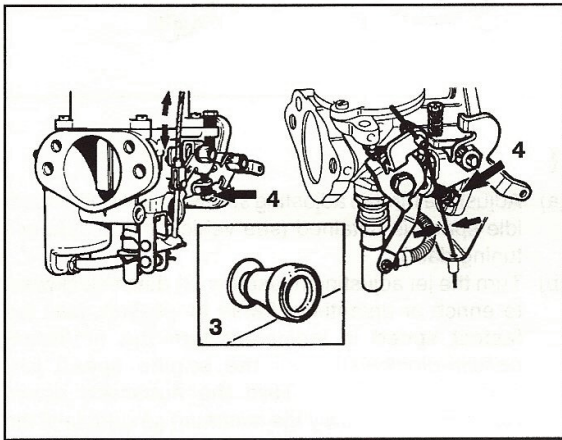
- Adjust the throttle adjusting screw (1) until the correct idle speed is obtained (see vehicle manufacturer's tuning data).
- Turn the jet adjusting nut/screw (2) down/clockwise, to enrich or up/anti-clockwise to weaken, until the fastest speed is indicated; turn the nut/screw up/anti-clockwise until the engine speed just commences to fall. Turn the nut/screw down/clockwise very slowly the minimum amount until the maximum speed is regained. From this setting adjust the mixture screw according to the vehicle manufacturer's recommendations.
- Check the idle speed, and readjust it as necessary with the throttle adjusting screw to obtain the correct setting.



HS Type Carburetter: Tuning (Single, Multi-Carbs)

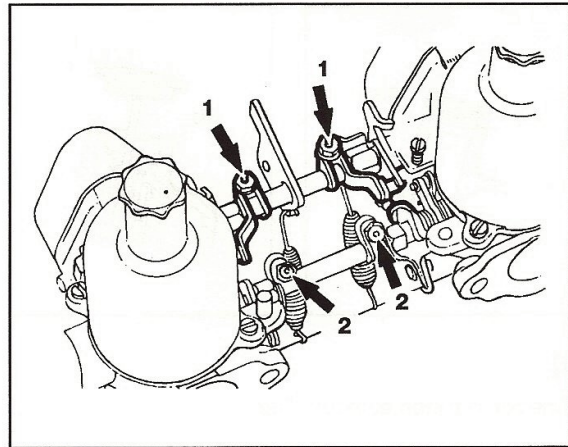
2

Vehicles with emission control. Using the exhaust gas analyser, check that the percentage CO reading is within the limits given by the vehicle manufacturer. If the reading falls outside the limits given, reset the jet adjusting nut/screw by the minimum amount necessary to bring the reading just within the limits given. If an adjustment exceeding three flats of the nut/half a turn of the adjusting screw is required to achieve this, then the carburetters must be removed and serviced.



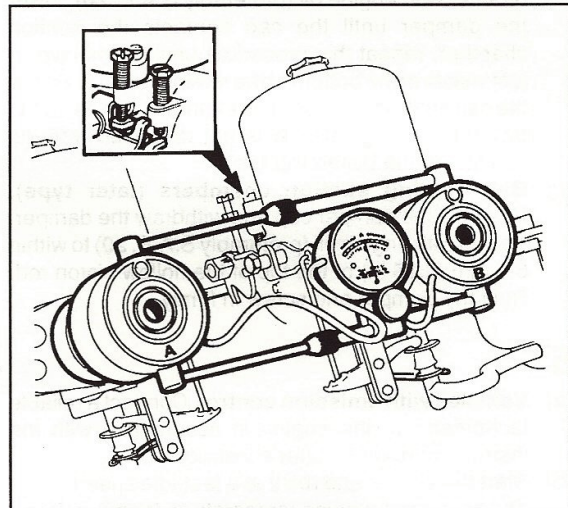
3

- With the fast-idle cam against its return stop, check that a 1.6 mm (1/16 in) free movement of the mixture control (choke) cable exists before the cable moves the cam.
- Pull out the mixture control (choke) (3) until the linkage is about to move the jet.
- Turn the fast-idle adjusting screw (4) clockwise until the correct fast-idle speed is obtained (see the vehicle manufacturer's recommendations).
- Refit the air cleaner.



1

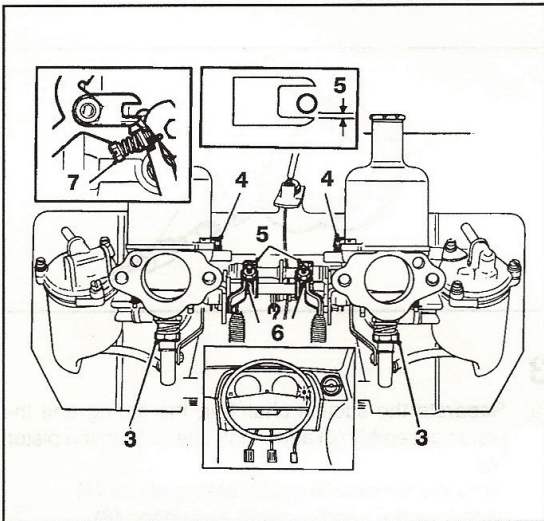
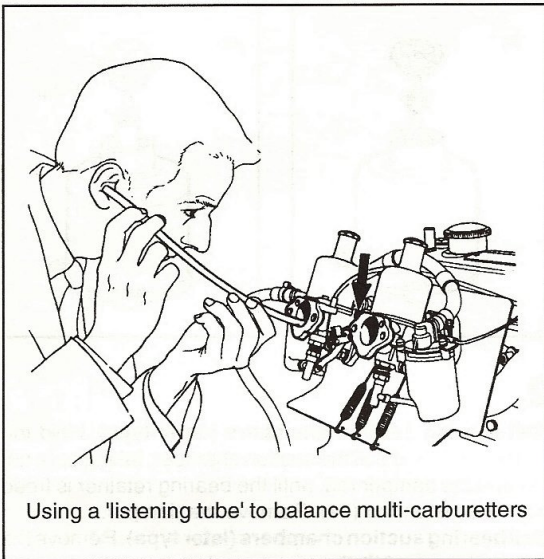
- Slacken both clamping bolts (1) on the throttle spindle interconnections.
- Slacken both clamping bolts (2) on the cold start interconnections.



2

Using a balancing meter in accordance with the maker's instructions, balance the carburetters by altering the throttle adjusting screws until the correct idle speed and balance is achieved. Alternatively, use a 'listening tube' to compare the intensity of the intake hiss on all carburetters (see diagram on following page) and turn the throttle adjusting screws until the hiss is the same.

HS Type Carburetter: Tuning (Multi-Carbs)



3

- (a) Turn the jet adjusting nut/screw (3) on each carburetter down/clockwise to enrich or up/anti-clockwise to weaken, by the same amount until the fastest speed is indicated; turn each nut/screw up/anticlockwise until the engine speed just commences to fall. Turn each screw very slowly down/clockwise by the

minimum amount until the maximum speed is regained. From this setting adjust the mixture screws according to the vehicle manufacturer's recommendations. (See graph on page 39).

- (b) Check the idle speed and readjust it as necessary with the throttle adjusting screws (4), turning each by the same amount.

4

- (a) **Vehicles with emission control.** Using the exhaust gas analyser, check that the reading is within the limits given in the vehicle manufacturer's tuning data. If the reading falls outside the limits given, reset both the jet adjusting nuts/screws by the minimum amount necessary to bring the readings just within the limits. If an adjustment exceeding three flats/half a turn is required to achieve this, the carburetters must be removed and serviced.

- (b) Set the throttle interconnection clamping levers (5), in accordance with the vehicle manufacturer's instructions, so that a clearance exists between the link pin and the lower edge of the fork. Tighten the clamp bolts, ensuring that there is approximately 0.8 mm (1/32 in) end-float on the interconnection rod.

- (c) Run the engine at 1,500 r.p.m. and check the throttle linkage for correct connection by rechecking the carburetter balance.

5

- (a) With the fast-idle cams of each carburetter against their respective stops, set the cold start interconnections, so that all cams begin to move simultaneously (6).

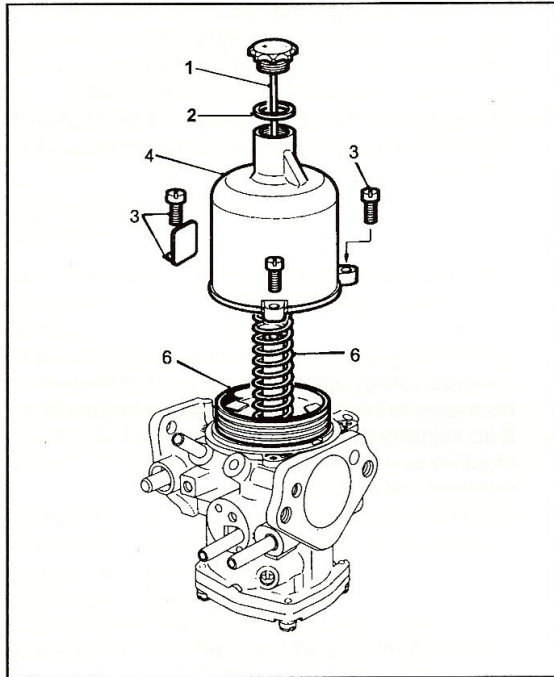
- (b) With the fast-idle cams against their stops check that a 1.6 mm (1/16 in) free movement of the mixture control (choke) cable exists before the cable moves the cams.

- (c) Pull out the mixture control (choke) until the linkage is about to move the jet.

- (d) Using the balancing meter or listening tube to ensure equal adjustment, turn the fast idle adjusting screws (7) to give the correct fast-idle speed.

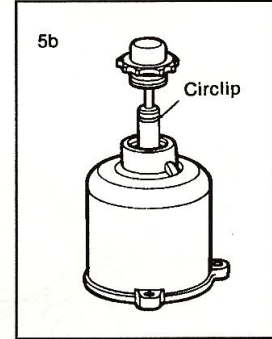
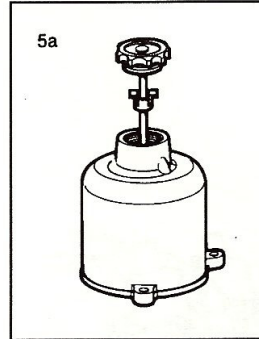
- (e) Refit the air cleaners.

HIF Type Carburetter: Dismantling



1

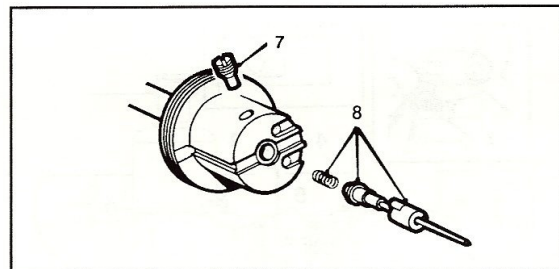
- Thoroughly clean the outside of the carburetters.
- Standard suction chambers. Remove the piston damper (1) and its washer (2), if fitted.
- Unscrew the suction chamber retaining screws (3) and remove the identity tag.
- Lift the chamber assembly (4) vertically from the body without tilting it.



2

Ball bearing suction chambers (early type). Hold the piston firmly and pull the suction chamber, taking care not to bend the damper rod, until the bearing retainer is freed from the piston rod (5a). Remove the damper.

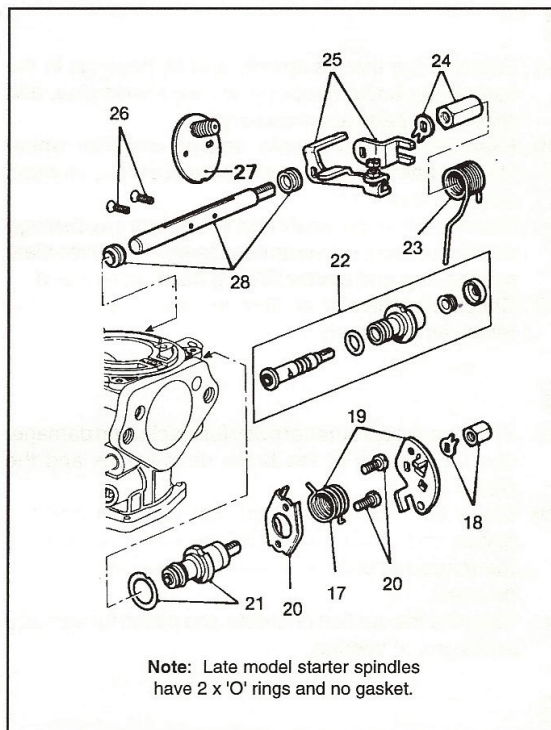
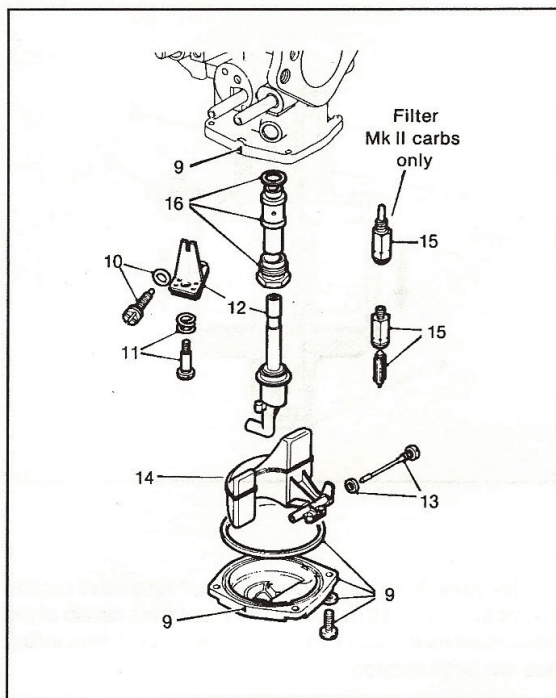
Ball bearing suction chambers (later type). Remove the piston damper. Lift the piston and remove the bearing retaining circlip (5b).



3

- Separate the suction chamber, the spring and the piston assembly (6) and empty the oil from the piston rod.
- Unscrew the needle guide locking screw (7).
- Withdraw the needle, guide and spring (8).

HIF Type Carburetter: Dismantling



4

- Mark the bottom cover-plate and body to ensure correct reassembly (9), unscrew the retaining screws and remove the cover complete with sealing ring.
- Remove the jet adjusting screw complete with 'O' ring (10).
- Remove the jet adjusting lever retaining screw and spring (11).
- Withdraw the jet complete with adjusting lever and disengage the lever (12).
- Remove the float pivot spindle and fibre washer (13).
- Withdraw the float (14).
- Remove the needle valve (15) and unscrew the valve seat. (Complete with filter, types HIF38 & HIF44 only).
- Unscrew the jet bearing locking nut and withdraw the bearing complete with its washer (16).

5

- Note the location of the ends of the fast idle cam lever return spring (17).
- Unlock and remove the cam lever retaining nut and locking washer (18).
- With the return spring held towards the carburetter body, prise off the cam lever and remove the return spring (19).
- Unscrew the starter unit retaining screws and remove the cover-plate (20).

- Withdraw the starter unit assembly and remove its gasket (21). Note: On later starter units the cover plate and starter body are designed not to be separated. This ensures greater accuracy of starter operation.
- Withdraw the valve spindle and remove the 'O' ring, seal and dust cap (22).

6

- Note the location and loading of the ends of the throttle lever return spring and remove the spring (23).
- Unlock and remove the nut and tab washer retaining the throttle levers (24).
- Remove the throttle lever and throttle actuating lever (25). These may vary quite considerably from those shown.
- Remove the throttle disc retaining screws (26).
- Close the throttle and mark the position of throttle disc in relation to the carburetter flange. Do not mark the disc in the vicinity of the overrun valve. Open the throttle and carefully withdraw the disc from the throttle spindle taking care not to damage the overrun valve (27).
- Withdraw the throttle spindle and remove its seals (28), noting the way it is fitted in relation to carburetter body to ensure the correct reassembly.

HIF Type Carburetter: Inspection

1

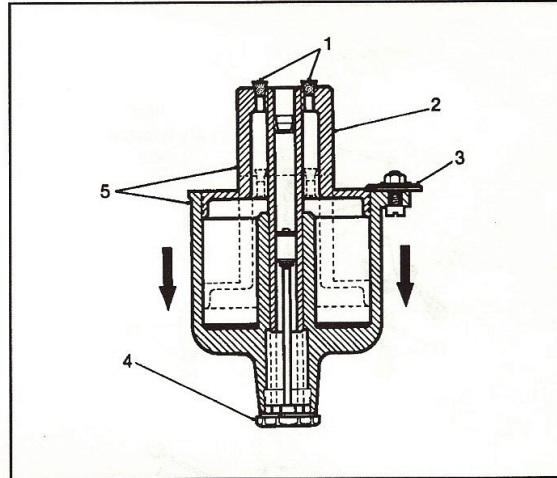
- (a) Examine the throttle spindle and its bearings in the carburetter body; check for any excessive play, and renew any parts as necessary.
- (b) Examine the float needle, seating and filter where fitted for damage, contamination and excessive wear; renew if necessary.
- (c) Examine all rubber seals and 'O' rings for any damage or deterioration; renew as necessary. The cover-plate sealing ring and starter 'O' ring must be renewed.
- (d) Check condition of all fibre washers and gaskets; renew as necessary.

2

- (a) Examine the carburetter body for cracks and damage, and for security of the brass connections and the piston key.
- (b) Clean the inside of the suction chamber and the piston rod guide with fuel or methylated spirit (denatured alcohol) and wipe dry. Abrasives must not be used.
- (c) Examine the suction chamber and piston for damage and signs of scoring.

3

Ball bearing suction chambers. Check that all the balls are in the piston ball race (2 rows, 6 per row). Fit the piston into the suction chamber, without the damper and spring, hold the assembly in a horizontal position and spin the piston. The piston should spin freely in the suction chamber without any tendency to stick.

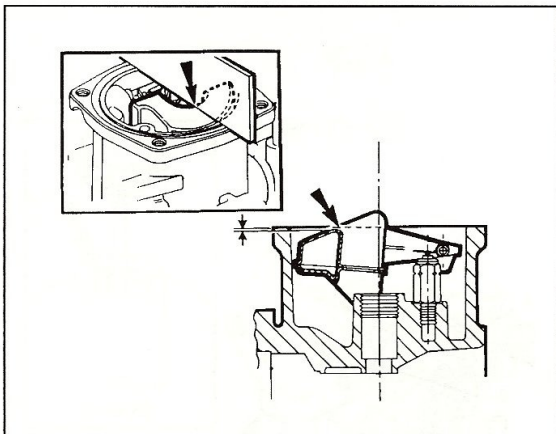


4

The following timing check applies only to standard suction chambers and need only be carried out if the cause of the carburetter malfunction which necessitated the dismantling has not been located.

- (a) Temporarily plug the piston transfer holes (1).
- (b) Fit the piston into the chamber without its spring (2).
- (c) Fit a nut and screw, with a large flat washer under the nut, into one of the suction chamber fixing holes, positioning the washer so that it overlaps chamber bore (3).
- (d) Fit the damper and washer (4).
- (e) Check that the piston is fully home in the chamber, invert the assembly to allow the chamber to fall away until the piston contacts the washer (5).
- (f) Check the time taken for the chamber to fall the full extent of the piston travel. For carburetters 38.0 mm (1.5 in) to 47.6 mm (1 7/8 in) bore, the time taken should be 5 to 7 seconds.
- (g) If the times are exceeded check the piston and chamber for presence of oil, foreign matter and damage. If after re-checking the time is still not within these limits, renew the suction chamber assembly.

HIF Type Carburetter: Reassembly



- (h) **Ball bearing suction chambers.** To prevent piston spring from being 'wound up' during reassembly, temporarily fit the piston and suction chamber, less the piston spring, to the body and pencil mark their relative positions to each other. Fit the spring to the piston, hold the suction chamber above the piston, align the pencil marks and lower the chamber over the spring and piston. It is essential that the bearing retention clip (early type) or the bearing retention circlip (later type) is correctly fitted.

Reassembly by reversing the procedure used to dismantle the carburetter, noting the following:

- (a) Ensure that the throttle disc is fitted in its original position.
- (b) New throttle disc retaining screws must be used when refitting the disc. Ensure that the throttle disc is correctly positioned and closes correctly before tightening the retaining screws. Spread the split ends of the screws sufficiently to prevent turning.
- (c) Position the throttle spindle end seals just below the spindle housing flange.
- (d) The starter unit valve is fitted with the cut-out towards the top retaining screw hole and its retaining plate is positioned with the slotted flange towards the throttle spindle. Apply a smear of oil to the starter 'O' ring prior to assembly, the starter should then enter the carburetter body with ease. If force has to be used this will invariably result in damage to the 'O' ring.
- (e) When fitting the jet assembly to the adjusting lever ensure that the jet head moves freely in the bi-metal cut-out.
- (f) After fitting the float and valve, invert the carburetter so that the needle valve is held in the shut position by the weight of the float only. Check that the point indicated on the float (see illustration) is 1.0 +/- 0.5 mm (0.04 +/- 0.02 in) below the level of the float chamber face (see illustration). Then adjust the float position by carefully bending the brass pad. Check that the float pivots correctly about the spindle.
- (g) Ensure that the needle guide fitted gives the needle bias in the required sense (either toward throttle disc or toward air cleaner). Before tightening the retaining screw, check that the needle guide is in its correct position relative to the piston face, either flush with the bottom of the piston on standard pistons or flush with the recess on recessed pistons.

HIF Type Carburettor: Tuning (General)

It is essential, particularly where vehicles are equipped and tuned to comply with engine emission control regulations, that the carburettors are tuned in accordance with the vehicle manufacturer's tuning data. To achieve the best results when tuning, the use of a reliable tachometer, balancing meter and an exhaust gas analyzer (CO meter of the infra-red non-dispersive type or equivalent are required). These instruments are essential when tuning vehicles equipped to conform with exhaust emission regulations.

Before servicing or tuning a carburettor in an endeavour to rectify poor engine performance, make sure that the maladjustment or fault is not from another source by checking the following:

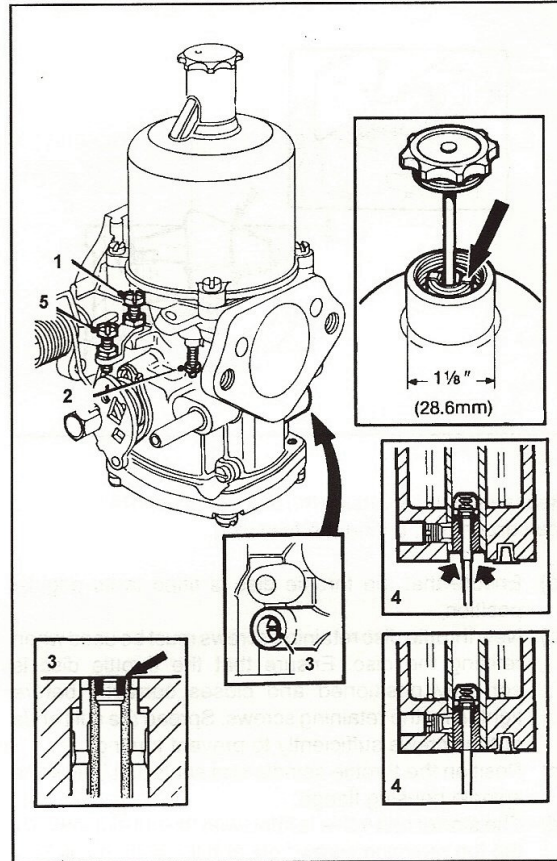
- Valve clearance
- Spark plug condition
- Contact breaker (dwell angle)
- Ignition timing and advance
- Presence of air leaks into the induction system

1

- (a) Remove the air cleaner(s).
- (b) Check the throttle for correct operation and signs of sticking.
- (c) Unscrew the throttle adjusting screw (each screw on multi-carburettors) until it is just clear of the throttle lever with the throttle closed, then turn the screw clockwise 1.5 full turns (single), one turn on each (multicarburettors) (1).
- (d) Raise the piston of each carburettor with the lifting pin (2) and check that it falls freely onto the bridge when the pin is released. If the piston shows any tendency to stick, the carburettor must be serviced.

2

- (a) Lift and support the piston clear of the bridge so that the jet is visible; if this is not possible due to the installed position of the carburettor, remove the suction chamber assembly.
- (b) Turn the jet adjusting nut/screw up/anti-clockwise, until the jet is flush with the bridge or as high as possible without exceeding the bridge height (3). Ensure that the jets on multi-carburettors are in the same relative position to the bridge of their respective carburettors.
- (c) Check that the sintered needle guide is flush with the underside face of the piston (4).
- (d) Turn the jet adjusting nut/screw (3) two turns down/clockwise (each nut/screw on multi-carburettors).
- (e) Turn the fast-idle adjusting screw anti-clockwise (each screw multi-carburettors) until it is well clear of the cam (5).

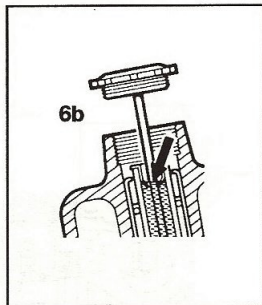
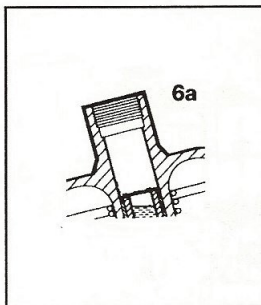


3

Refit the suction chamber assembly if it has been removed and, using the lifting pin (2), check that the piston falls freely onto the bridge.

Note: If ball bearing suction chambers are fitted take care not to wind up the piston spring when refitting the suction chamber - see reassembly section.

HIF Type Carburettor: Tuning (General, Single Carbs)



4

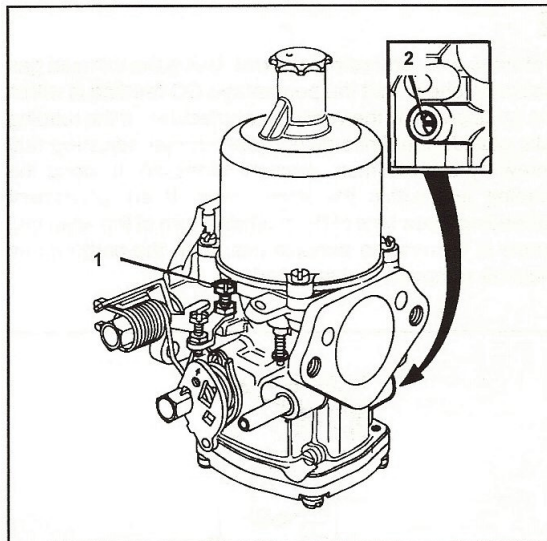
Check the piston damper oil level:

- (a) **Standard suction chambers.** Unscrew the cap and withdraw the damper. Top up with engine oil (preferably S.A.E. 20) until the level is just below the top of the hollow piston rod, refit the damper and screw the cap firmly into the suction chamber (6a).
- (b) **Ball bearing suction chambers (early type).** Unscrew the cap and *carefully* raise the piston and damper to the top of their travel. Fill the recess in the damper retainer with engine oil (preferably S.A.E. 20), lower the damper until the cap contacts the suction chamber, repeat this procedure until the oil level is just visible at the bottom of the retainer recess. Screw the cap firmly into the suction chamber. It is essential that the bearing retainer is not displaced from its position in the piston rod (6b).
- (c) **Ball bearing suction chambers (later type).** Unscrew the damper cap and withdraw the damper. Top up with engine oil (preferably S.A.E. 20) to within 6.5 mm (0.25 in) of the top of the hollow piston rod. Refit the damper and screw in firmly.

5

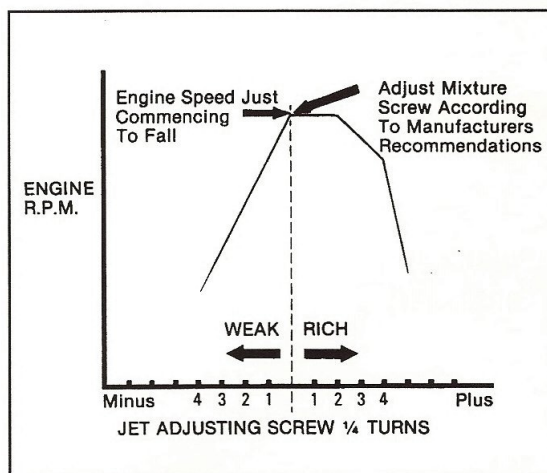
- (a) **Vehicles with emission control.** Connect a reliable tachometer to the engine in accordance with the instrument manufacturer's instructions.
- (b) Start the engine and run it at a fast-idle speed until it attains normal running temperature, then run it for a further five minutes.
- (c) Increase the engine speed to 2,500 r.p.m. for 30 seconds.
- (d) **Vehicles with emission control.** Connect an exhaust gas analyser to the engine in accordance with the instrument manufacturer's instructions.

Setting can now commence. If the correct setting cannot be obtained within three minutes, increase the engine speed to 2,500 r.p.m. for 30 seconds and then recommence tuning. Repeat this clearing operation at three-minute intervals until tuning is completed.



1

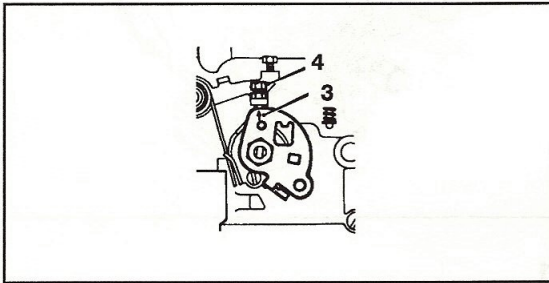
- (a) Adjust the throttle adjusting screw (1) until the correct idle speed is obtained (see vehicle manufacturer's tuning data).
- (b) Turn the jet adjusting screw (2) clockwise to enrich or anti-clockwise to weaken, until the fastest speed is indicated; turn the screw anti-clockwise until the engine speed just commences to fall. Turn the screw clockwise very slowly the minimum amount until the maximum speed is regained. From this setting adjust the mixture screw according to the vehicle manufacturer's recommendations.
- (c) Check the idle speed, and readjust it as necessary with the throttle adjusting screw to obtain the correct setting.



HIF Type Carburetter: Tuning (Single, Multi-Carbs)

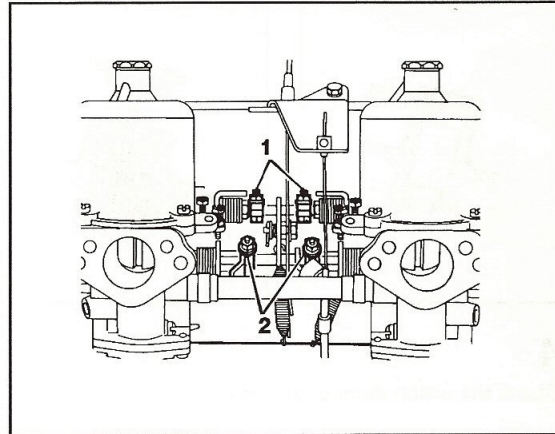
2

Vehicles with emission control. Using the exhaust gas analyser, check that the percentage CO reading is within the limits given by the vehicle manufacturer. If the reading falls outside the limits given, reset the jet adjusting nut/screw by the minimum amount necessary to bring the reading just within the limits given. If an adjustment exceeding three flats of the nut/half a turn of the adjusting screw is required to achieve this, then the carburetters must be removed and serviced.



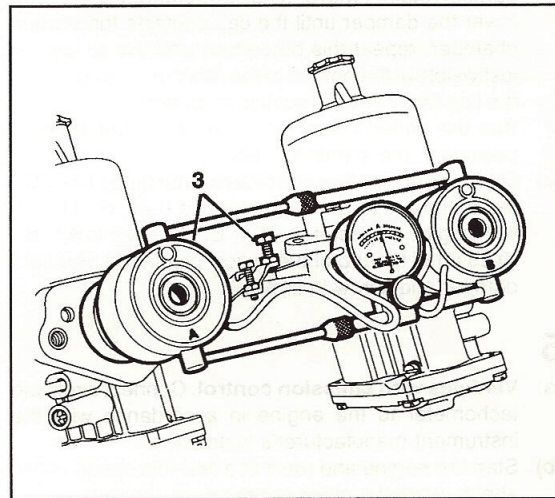
3

- With the fast-idle cam against its return stop, check that a 1.6 mm (1/16 in) free movement of the mixture control (choke) cable exists before the cable moves the cam.
- Pull out the mixture control (choke) (3) until the linkage is about to move the jet.
- Turn the fast-idle adjusting screw (4) clockwise until the correct fast-idle speed is obtained (see the vehicle manufacturer's recommendations).
- Refit the air cleaner.



1

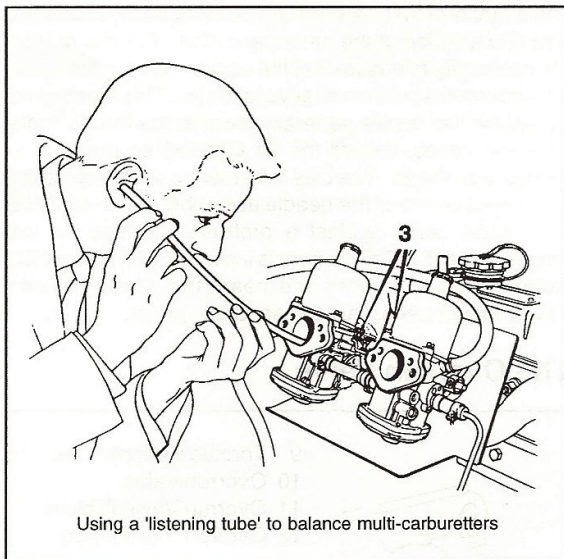
- Slacken both clamping bolts (1) on the throttle spindle interconnections.
- Slacken both clamping bolts (2) on the cold start interconnections.



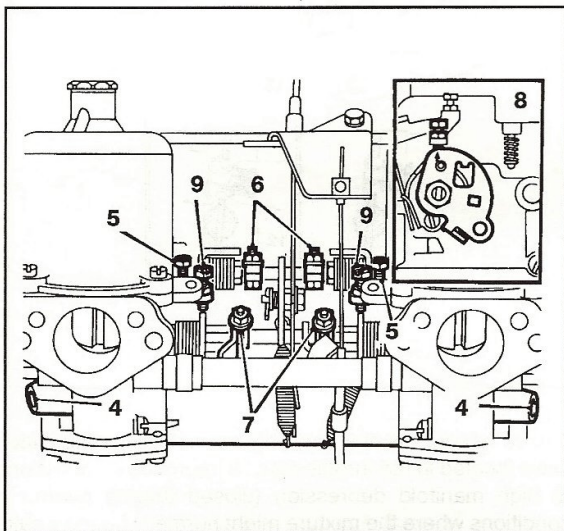
2

Using a balancing meter in accordance with the maker's instructions, balance the carburetters by altering the throttle adjusting screws (3) until the correct idle speed and balance is achieved. Alternatively, use a 'listening tube' to compare the intensity of the intake hiss on all carburetters (see diagram on following page) and turn the throttle adjusting screws until the hiss is the same.

HIF Type Carburettor: Tuning (Multi-Carbs)



Using a 'listening tube' to balance multi-carburettors



3

- (a) Turn the jet adjusting screw (4) on each carburettor clockwise to enrich or anti-clockwise to weaken, by the same amount until the fastest speed is indicated; turn each screw anticlockwise until the engine speed just commences to fall. Turn each screw very slowly clockwise by the minimum amount until the maximum speed is regained. From this setting adjust the mixture screws according to the vehicle manufacturer's recommendations. (See graph on page 47).
- (b) Check the idle speed and readjust it as necessary with the throttle adjusting screws (5), turning each by the same amount.

4

- (a) **Vehicles with emission control.** Using the exhaust gas analyser, check that the reading is within the limits given in the vehicle manufacturer's tuning data. If the reading falls outside the limits given, reset both the jet adjusting screws by the minimum amount necessary to bring the readings just within the limits.
- (b) Set the throttle interconnection clamping levers (6), in accordance with the vehicle manufacturer's instructions, so that a clearance exists between the link pin and the lower edge of the fork. Tighten the clamp bolts, ensuring that there is approximately 0.8 mm (1/32 in) end-float on the interconnection rod.
- (c) Run the engine at 1,500 r.p.m. and check the throttle linkage for correct connection by rechecking the carburettor balance.

5

- (a) With the fast-idle cams of each carburettor against their respective stops, set the cold start interconnections, so that all cams begin to move simultaneously (7).
- (b) With the fast-idle cams against their stops check that a 1.6 mm (1/16 in) free movement of the mixture control (choke) cable exists before the cable moves the cams.
- (c) Pull out the mixture control (choke) until the linkage is about to move the jet (8).
- (d) Using the balancing meter or listening tube to ensure equal adjustment, turn the fast idle adjusting screws (9) to give the correct fast-idle speed.
- (e) Refit the air cleaners.

Emission Control Features

When emission legislation was introduced, it was necessary to introduce features into the carburettor which enabled the vehicle to run at lower emission levels. Also, it was most important that once a satisfactory level is reached, this level will remain constant. This was achieved on the SU carburettor by means of the following.

Fuel Temperature (Viscosity) Compensation

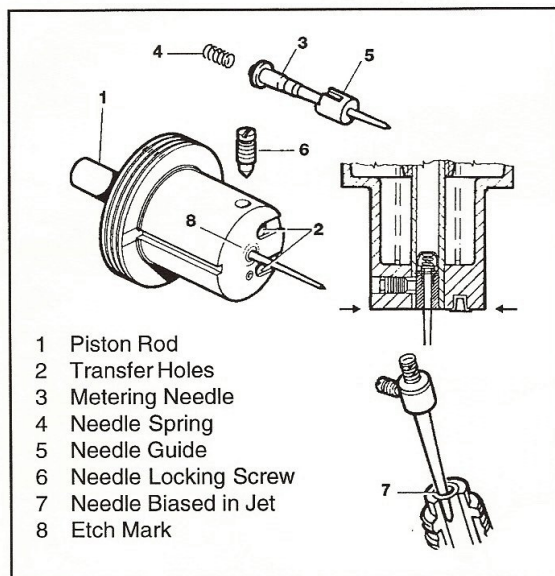
Various systems are used on the different types of SU carburettor, each of which achieves compensation by movement of the jet. The systems used are:

- (a) Bi-metal on HIF carburetters (standard feature)
- (b) Capstat on HS carburetters (optional)
- (c) Bi-metal disc on HS8 carburetters (optional)

These systems are described in more detail in the relevant literature.

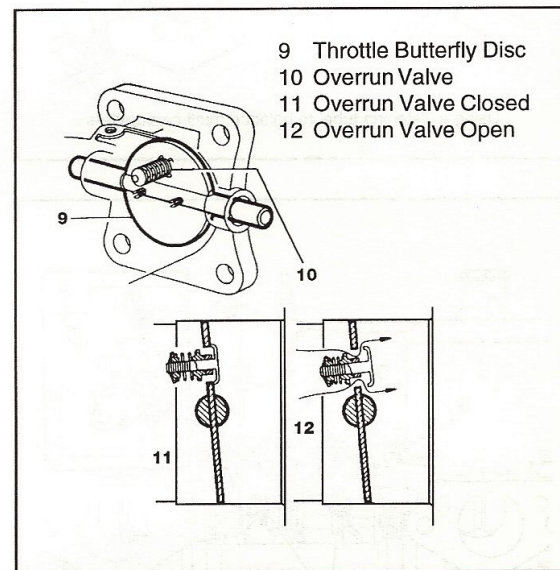
As the temperature rises, the fuel viscosity lowers and fuel flows more freely. To stop the consequent enrichment of the mixture due to this characteristic, the fuel temperature compensator moves the jet towards the needle by an amount proportional to the increase in temperature, and, conversely, moves the jet away from the needle as the temperature drops.

Spring-Loaded Metering Needle



The quantity of fuel metered can be affected by the shape, size and position of the metering orifice. For this reason it is necessary to ensure that the needle stays in the same circumferential position relative to the jet. This is achieved by biasing the needle generally towards the throttle plate (in some cases, toward the air cleaner) so that it is in contact with the jet. The bias is by means of a small spring (4) located on top of the needle assembly (3) which loads the needle collar against a protrusion formed on the needle guide (5). This feature is included in all current SU carburettor specifications and means that where included it is no longer necessary to centralize the jet.

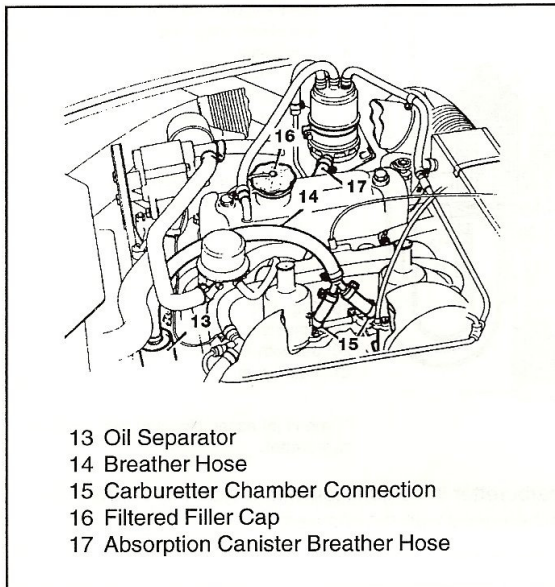
The Overrun Valve



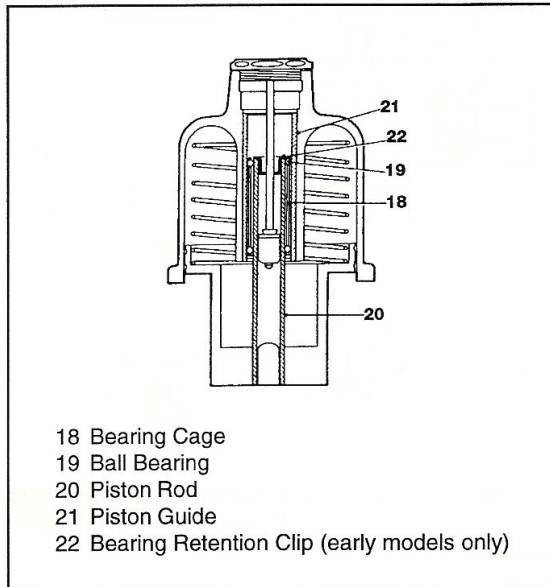
The valve consists of a precisely set, spring-loaded plate valve located in the throttle disc. It improves combustion at high manifold depression (closed throttle overrun) conditions where the mixture might normally be too weak for complete combustion. The valve opens slightly against its spring under high manifold depression and allows a quantity of correct fuel/air mixture into the combustion chamber. This action helps to maintain correct combustion and prevents the emission of high levels of unburnt hydrocarbons.

Emission Control Features

Crank Case Emission Control



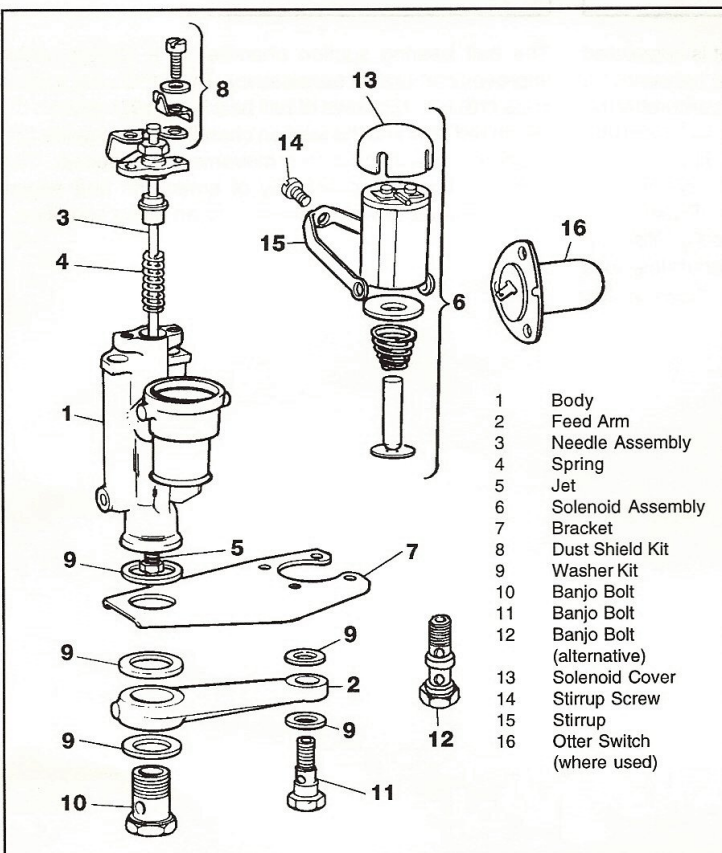
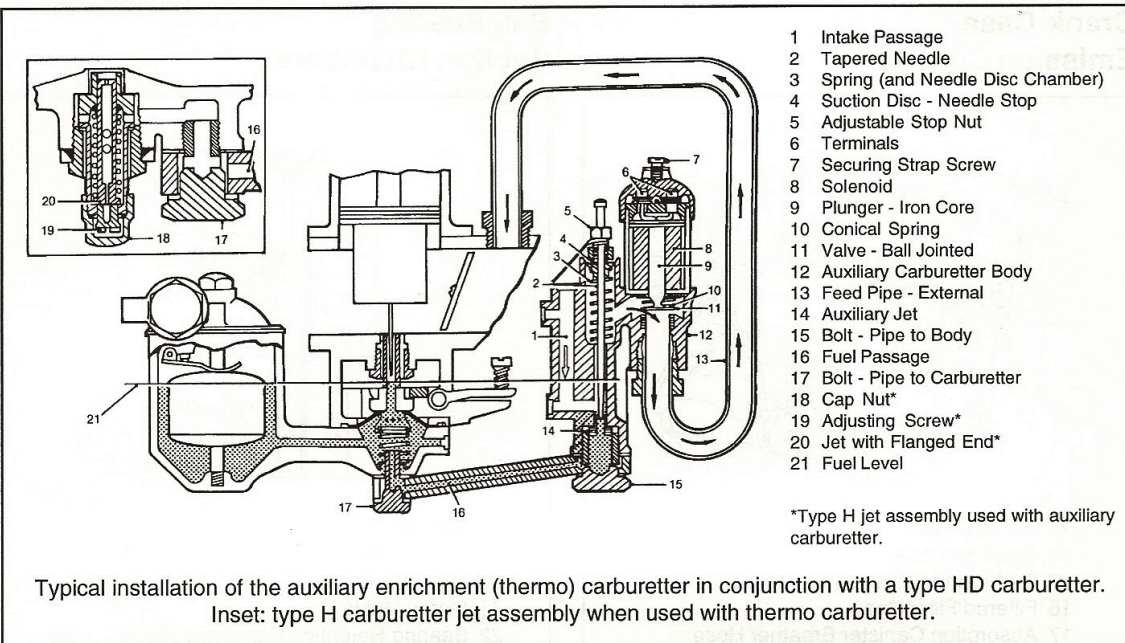
Ball Bearing Suction Chambers



With this system the engine breather outlet is connected by hoses to the constant depression area between the piston and the throttle disc valve of the carburetter(s). Engine fumes and blow-by gases are drawn from the crankcase by the depression in this area, through an oil separator incorporated in the engine outlet connection, and from there on to the inlet manifold. Fresh air is supplied to the engine through the combined oil filler cap and filter, or, on cars fitted with fuel evaporative loss control systems, through the breather hose of the absorption canister.

The ball bearing suction chamber is a feature which improves carburetter consistency. By introducing a nylon cage (18) with two rows of ball bearings (19) between the piston rod (20) and the suction chamber piston guide (21) the hysteresis in the piston movement is reduced. This leads to greater repeatability of emissions and engine speed especially when returning to an idling condition.

Auxiliary Enrichment Carburetter (Thermo)



The auxiliary carburetter is used on certain installations to provide automatically differing degrees of mixture enrichment at:

- a) Starting
- b) Idling and light cruising conditions
- c) Full throttle conditions.

It may be used with single- or multi-carburetter installations.

The unit may be controlled by either:

- a) A thermostatically operated switch housed in the cylinder head coolant jacket and set to bring the apparatus into operation below 35°C (95°F).
- b) A manually operated switch, which is generally provided with a warning light.

The auxiliary carburetter is a separate unit attached to the main carburetter. When fitted to type H carburetters the construction of the main carburetter jet assembly differs from normal in the method of mixture adjustment.

The device consists of a solenoid-operated valve and a fuel metering needle which draws its fuel from the base of the auxiliary jet supplied from the main carburetter.

Auxiliary Enrichment Carburettor (Thermo)

When the device is operated, air is drawn from the atmosphere through the air intake into a chamber and is mixed with fuel as it passes the jet. The mixture then passes upwards past the shank of the needle, through a passage, and so past the aperture provided between the valve and its seating. From here it passes directly to the main induction manifold through the external feed pipe as shown in the diagram (top left).

The device is brought into action by energizing the solenoid. The iron core is thus raised carrying with it the ball-jointed disc valve against the load of the conical spring, thereby opening the aperture between valve and seating.

A cup washer is fitted against the solenoid face to centralise the conical spring. Any leakage between the valve and its seating would allow the device to operate and affect the idling setting of the main carburettor(s).

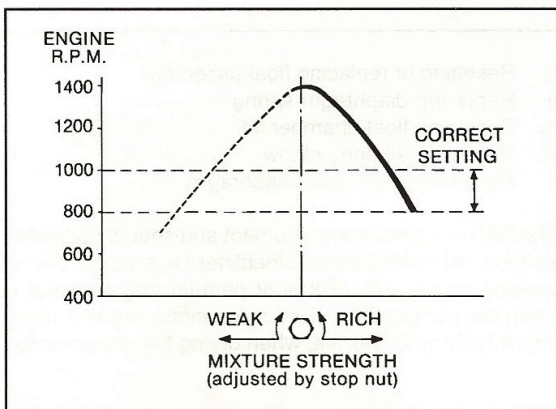
If the solenoid is energized while the engine is idling the valve will not normally lift owing to the high manifold depression; the act of opening the throttle will reduce manifold depression and allow the device to operate.

The fuel level in the auxiliary carburettor is controlled by the main carburettor float chamber. It can be seen from the illustration that this results in a reservoir of fuel remaining in the well of the auxiliary carburettor.

When starting with the device in operation, this fuel is drawn into the induction manifold to provide the rich mixture necessary for instant cold starting.

When the valve has lifted, the needle disc chamber is in direct communication with the inlet manifold and the depression, dependent on throttle opening, varies the position of the needle by exerting a downward force upon the suction disc and needle assembly. Thus:

- a) At idling the relatively high depression will draw the needle into the jet until the needle head abuts against the adjustable stop.
- b) At larger throttle openings a reduced depression is communicated to the needle disc chamber and the spring will tend to overcome the downward movement of the needle, thus increasing mixture strength.



Tuning and Adjustment

Main Carburettor(s)

As both the main and auxiliary carburetters operate when starting from cold, the main carburettor(s) must be tuned correctly before attempting any adjustment to the auxiliary carburettor. Refer to the appropriate tuning guide in this manual, and to the following mixture adjustment instructions for type H carburetters.

Mixture Adjustment - Type H Carburettor

The procedure for mixture adjustment is the same as for normal type H carburetters except that a jet adjusting screw is used in place of the normal jet adjusting nut (see inset diagram) as follows:

- (a) Remove the cap nut
- (b) Adjust the jet as required, by turning the slotted screw up to weaken or down to enrich the mixture. The slight leakage of fuel through the jet during this operation can be ignored.
- (c) Replace the cap nut with its sealing washer.

Auxiliary Carburettor

Tuning of the auxiliary carburettor is confined to adjustment of the stop nut which limits the downward movement of the needle, and is carried out with the engine running at normal temperature and the main carburettor(s) tuned. Proceed as follows:

1

- (a) Switch on the auxiliary carburettor.
- (b) Where the thermostat has automatically broken the circuit, energize the solenoid by short-circuiting the thermostat switch to earth, or if this is inaccessible, earth the appropriate terminal of the auxiliary carburettor with a separate wire.
- (c) Where a manual switch is fitted, switch on.

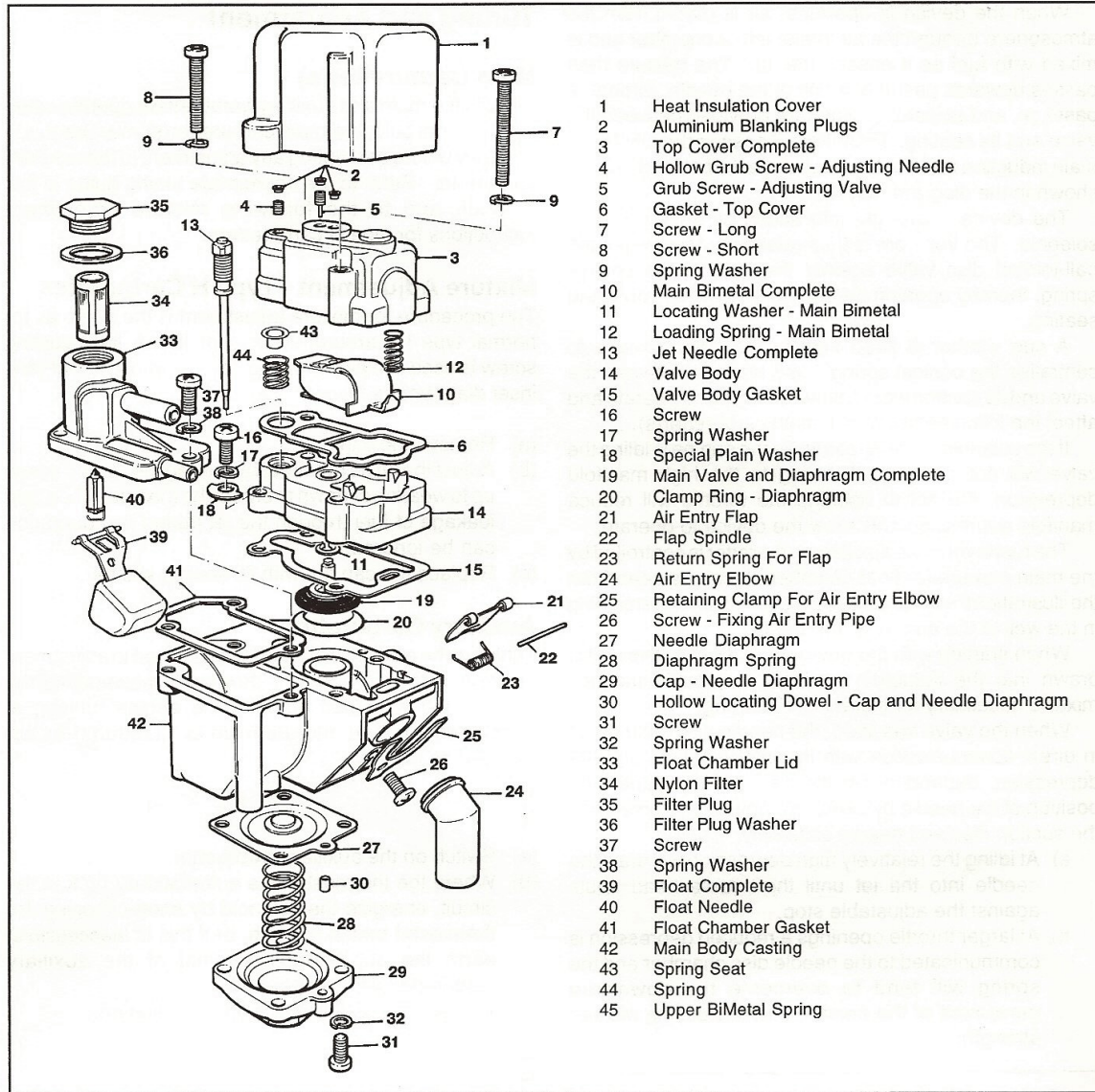
2

Open the throttle momentarily to allow the valve to lift.

3

- (a) Adjust the stop nut(s) with reference to the graph.
- (b) Initially clockwise (to weaken) until the engine begins to run erratically.
- (c) Then anti-clockwise (to enrich) through the phase where the engine speed has risen markedly to the point where overrichness results in the engine speed dropping to between 800 and 1,000 rpm with the exhaust gases noticeably black in colour.

Automatic Enrichment Device: Servicing



Servicing of the AED unit is limited due to the precise setting operations carried out at the factory. If however adjustments are made to the unit, mark the original settings and then adjust in accordance with these instructions. The operations which can be carried out are:

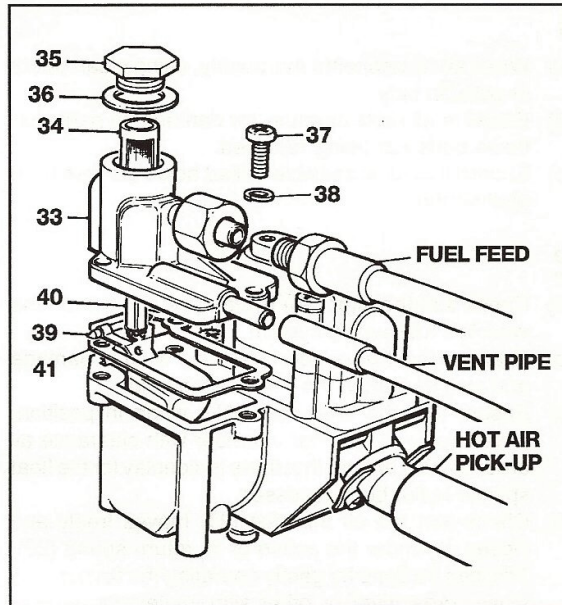
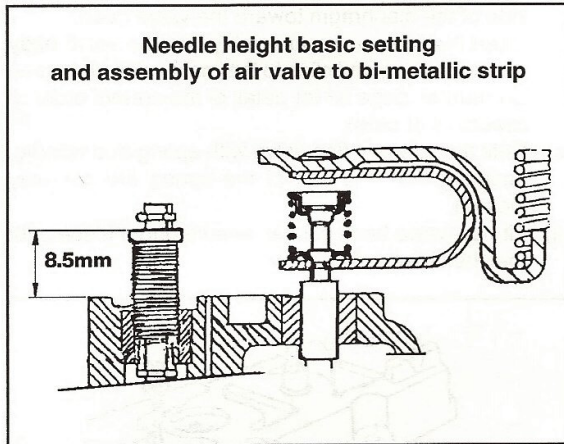
- Ensuring security of external connections
- Cleaning (or replacing) inlet filter
- Checking cleanliness of float chamber and fuel inlet valve (or replacing)
- Checking and cleaning of the needle diaphragm (or replacing) and associated passages

- Resetting or replacing float assembly
- Replacing diaphragm spring
- Replacing float-chamber lid
- Replacing air entry elbow
- Replacing main valve diaphragm

The AED is a precision instrument and should be treated as such. High standards of cleanliness are required when working on the unit. Petrol or paraffin may be used to clean the components. Use nylon cloth, never material that is fluffy or leaves lint, when drying the components.

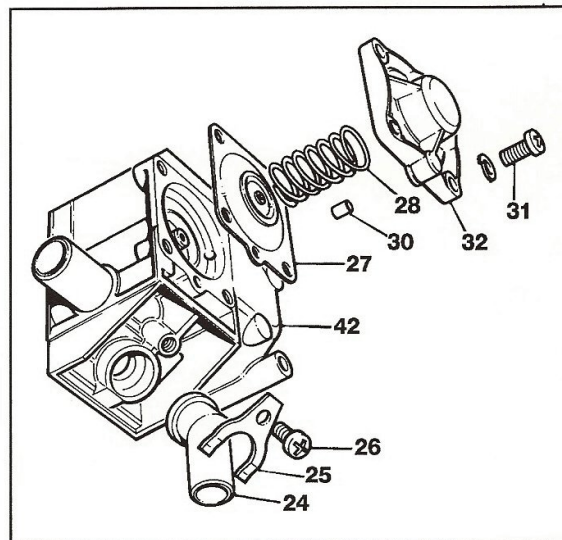
Automatic Enrichment Device: Dismantling

Note: For unit removal and fitting instructions refer to vehicle manufacturer's literature.



1

- (a) Remove the polypropylene heat insulation cover. Then, using a thin-bladed screwdriver, prize out the three aluminium blanking plugs (2) in the top cover.
- (b) Holding the unit upright remove the screws (7,8) retaining the bakelite top cover (3) and remove the cover.
- (c) Disengage the main bi-metal from the air valve stem (see diagram above).
- (d) Remove the two screws retaining the moulded body (14) and lift off the body.
- (e) Dismantle the spring clip assembly from the air valve stem and remove the valve, complete with diaphragm, from the body.
- (f) Remove the jet needle (13) from the valve body, noting the number of turns (flats) required for its removal.
- (g) Lift the lower body gasket in order to remove the air entry flap valve, together with the spindle and spring.



2

- (a) Unscrew the large screwed plug (35) and remove the filter.
- (b) Unscrew the three screws (37) retaining the float chamber lid (33) and carefully remove the lid. If it is stuck to the main body, separate by tapping the side of the lid with the handle of a screwdriver.
- (c) Remove the float needle (40) and float assembly (39) complete with the hinge pin. The float needle may now be detached from the float by unhooking the wire stirrup.
- (d) Remove the float lid gasket (41).
- (e) Drain any residual fuel by inverting the unit.

3

- (a) With the unit inverted, unscrew the four screws (31) retaining the needle diaphragm cap (29) and hold the cap against the load of the spring (28) inside it whilst withdrawing the screws. If the cap is stuck to the diaphragm, hold the unit firmly then separate by tapping at the side with the handle of a screwdriver.
- (b) Remove the cap, spring, diaphragm (27) and hollow locating dowel (30) from the main body (42).
- (c) Unscrew the screw (26) retaining the air entry pipe clamp (25) and remove the clamp and the pipe (24).

Automatic Enrichment Device: Inspection, Reassembly

1

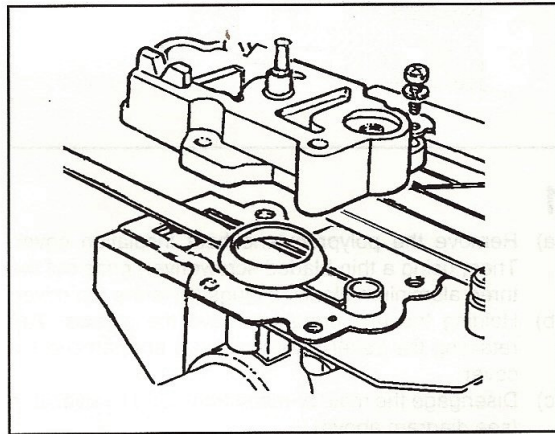
- (a) Wash all components thoroughly, using clean petrol or paraffin only.
- (b) Examine all parts carefully for damage, in particular those parts not being replaced.
- (c) Ensure that all accessible drilled holes are free from obstruction.

2

- (a) Check that the filter (34) is clean as a check on the vehicle's fuel supply system.
- (b) Examine the float needle tip (40) for wear or damage and also its seat in the float chamber lid.
- (c) Ensure that the float assembly, when in position, pivots freely in the float chamber with clearance all around. Also ensure that there is sideplay for the float spindle in the body recesses.
- (d) Check that the air inlet flat (21) moves freely and closes off under the action of its return spring (23). This can be done by gently operating the flap using a small screwdriver or other slim implement through the air inlet orifice.

1

- (a) Fit the new main valve diaphragm with the concave side of the diaphragm toward the valve head.
- (b) Insert the main valve assembly into the valve body and refit spring and clips to the main valve stem (see diagram on page 55 for detail of the correct order of assembly of clips).
- (c) Refit the air entry flap valve with spring and spindle, ensuring that the legs of the spring are correctly located.
- (d) Fit new valve body gasket, ensuring that it does not foul the air entry flap valve.



2

- (a) Place a steel rule along the main body to cover the valve seating. Position the diaphragm clamp ring directly over the main valve seat on the steel rule.
- (b) Align the valve body carefully over the main body so that the clamp ring engages in the diaphragm recess and fit the two short screws with spring washers.
- (c) Lightly tighten the screws and remove the steel rule. **It is important to check that the jet needle threaded insert in the valve body is aligned with the jet tube bore before fully tightening the securing screws.**
- (d) Check the operation of the air entry flap valve ensuring that it is lightly sprung onto its seat.

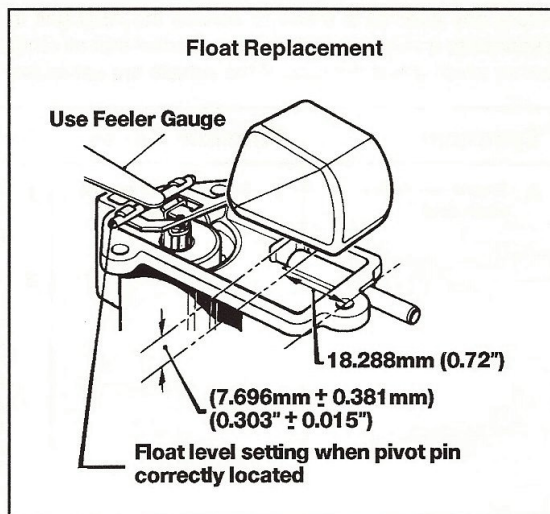
Automatic Enrichment Device: Reassembly

3

- (a) Drop the jet needle into the jet tube and screw the square-headed adjuster screw into the valve body until the dimension in the drawing on page 55 is achieved or to where the jet needle was prior to dismantling. Check the location of the needle in the jet before fitting the needle diaphragm.
- (b) Position the top cover gasket.
- (c) Refit the main bi-metal with the bi-metal slotted on the main valve stem under the lower clip (see the drawing on page 55) and resting on its 'V' pivot slots.
- (d) Fit the top cover noting that there are, in some top covers, internal moulded serrations which hold the jet needle in position and that the spring in the cover locates on the main bi-metal.
- (e) Refit the air entry pipe.

4

- (a) With the unit inverted, fit the new needle diaphragm assembly as follows: Ensure that the hollow dowel (30) is free from obstruction and fit it to the main body.
- (c) Place the diaphragm (27) over the dowel, with the float rivet head downwards, and align it with the screw holes.
- (d) Position the spring (28) in the locating place of the diaphragm.
- (e) Place the cap (29) over the spring and press down towards the body. Take care to engage with the hollow dowel and to keep screw holes aligned.
- (f) Whilst holding the cap down against the pressure of the spring, check that the diaphragm has not puckered around the edges of the screw holes.
- (g) Fit the four screws with their spring washers and tighten down evenly.



5

- (a) The following procedure must be adhered to when replacing the float chamber lid assembly: Fit a new float chamber lid gasket to the body of the unit.
- (b) Using the new components supplied, invert the float chamber lid and drop the float needle into its seating.
- (c) Fit the float assembly ensuring that the needle is correctly located on the float by means of its wire stirrup.
- (d) Holding the float assembly to the face of the lid with the tip of a steel rule or feeler gauge (as shown in diagram above) position the lid over the float chamber close enough to allow the float hinge pin to drop into position, when the feeler gauge is removed, without the needle falling from the seating bore or the stirrup becoming disengaged.
- (e) Lower the lid the rest of the way onto the main body, align the screw holes, and fit the three screws and spring washers including the specification tag.
- (f) Tighten the screws evenly.
- (g) Test that the float is free to move in the chamber by rotating the whole unit around the float pin axis and listening for movement of the float.

6

- (a) Refit the filter (34) and plug (35) using a new washer (36).
- (b) On completion of tuning adjustments fit the aluminium blanking plugs and heat insulation cover.
- (c) Refit the unit to the vehicle in accordance with the manufacturer's instructions ensuring that all connections are secure and that all pipework is leak free.

Automatic Enrichment Device: Fault Diagnosis

Before any attempt is made to service the AED unit in response to a vehicle problem it is essential that all other factors which affect the tune of the vehicle are set as per manufacturer's instructions. These include sparking plugs, contact breaker, ignition timing, tappets and main carburettor tune.

Symptom	Possible Cause	Remedy
A Engine fails to fire when cold	1 Inadequate or no fuel supply to the AED	<p>1 Slacken the filter plug on the AED. Crank the engine; fuel should leak from the plug. If no fuel, check the system leading to the AED. If fuel is present, tighten the plug. Then carry out check 2 under symptom A.</p> <p>2 Note: This check is not applicable when AED temperature is above 35°C (95°F). Crank the engine for several seconds. Remove the pipe at the inlet manifold. If fuel is present, it indicates that the AED is satisfactory and the cause for failure to start must be traced to some other source. If no fuel is present this indicates a faulty AED. Proceed as follows: Remove the float-chamber lid and check that the needle valve and float are free to move. If there is no fuel in the float chamber, check that the fuel filter is clean and that ample fuel is being delivered to the unit. If adequate fuel is being delivered to the float chamber this indicates a malfunction elsewhere in the unit (provided the temperature is within the unit operating range) and the unit should be replaced.</p>
	2 Faulty air flap valve	2 Remove the air inlet elbow on the AED and check that the flap valve is free to move and return under spring load.
B Engine fires but fails to keep running when cold	1 Sticking or faulty needle valve or float	<p>1 Check the following:</p> <p>a) Remove the vent pipe from the float chamber and check that fuel is not discharged when cranking the engine.</p> <p>b) If fuel is discharged, check the operation of the needle valve and float as detailed under A item 2.</p>
	3 Inadequate fuel supply	3 Check for lack of fuel as detailed under A .
	4 Faulty jet needle diaphragm	4 Remove the AED complete and service as shown in the servicing instructions. If the diaphragm is satisfactory, a replacement unit should be fitted.
	2 Faulty air flap valve	2 Remove the air inlet elbow on the AED and check that the flap valve is free to move and return under spring load.
C Engine fails to start when hot or part warm or fires and fails to keep running	1 Incorrect starting procedure	1 Crank the engine and open the throttle slightly. If the unit is badly over-choked open the throttle fully. Do not over-rev. If the engine starts but fails to keep running, carry out check 4 below.
	2 Leaks from pipe layout	2 Ensure that all pipes are correctly fitted, particularly the pipe between the hot air pick-up and the AED. Rectify as necessary, ensuring air-tight joints. Note: Air leaks at the hot air entry will result in excessive fuel consumption and the possibility of stalling at certain engine temperatures.
	3 Before carrying out further checks ensure that the AED is not the cause of failure to start	3 Remove the pipe from the AED to inlet manifold. Blank off the aperture in the manifold. If the engine starts this indicates that the AED is at fault, and further checks must be made. However, if the engine is flooded, it may be necessary to crank for several seconds with a slightly open throttle before the engine will fire.
	4 Sticking or faulty needle valve or float	<p>4 Check the following:</p> <p>a) Remove the vent pipe from the float chamber and check that fuel is not discharged when cranking the engine.</p> <p>b) If fuel is discharged, check the operation of the needle valve and float. Remove the float chamber lid. Check that needle valve and float are free to move. If there is no fuel in the float chamber, check that the fuel filter is clean and that ample fuel is being delivered to the unit. See the servicing instructions.</p>
	5 Faulty needle diaphragm	5 Carry out checks as detailed under B item 4 .

Automatic Enrichment Device: Tuning

The AED unit has been pre-set to give a satisfactory running condition on the majority of engines. However, like the main carburetters, it may require trimming of the mixture and idle speed settings to accommodate the individual fueling requirements of your engine. This operation must be completed within the first 3 minutes (approx.) of running time, ie before any substantial amount of heat reaches the AED to cause significant movement of the bimetals. It may therefore take more than one cold start to achieve the desired results.

Installation

When fitting the new AED it is essential to ensure that the hot air pipe, which runs around the back of the engine to the rear exhaust manifold, is correctly installed, and that the insulation which clads the pipe is complete and undamaged. Ensure that the connection to the hot-spot on the rear exhaust manifold is secure and there are no gaps which might admit cool air.

Priming The AED With Fuel

On early vehicles the AED can be primed with fuel by merely switching on the ignition, which immediately activates the fuel pump. Later vehicles are fitted with an engine oil pressure sensitive inhibitor switch in the electrical circuit of the fuel pump. The engine therefore has to be cranked for several seconds in order to activate the fuel pump and allow it to prime the AED. In either case, wait approximately 20 seconds before attempting to start the engine, to allow the fuel well in the AED to fill.

Checking The Mixture Strength

Start the engine. Initially it should run slightly rich as the fuel well is used up, but after approximately 10 seconds should settle down to more even running. An erratic beat and visible exhaust fumes indicates too rich a mixture. Surging, or the inability to run for more than a few seconds culminating in a rapid stall out indicates too weak a mixture.

Mixture Adjustment

- (a) Remove the push-on plastic insulating cover (1).
- (b) Unscrew and remove the two screws retaining the top cover (7, 8).
- (c) Disengage cover from gasket and remove carefully (3).
- (d) The mixture is regulated by the square headed brass screw which carries the metering needle (13). Move in increments of not more than 1/8 of a turn (half flat), clockwise to weaken, anti-clockwise to richen.

- (e) Carefully replace the top cover ensuring that the gasket is correctly positioned and the C-shaped spigot, moulded on the underside of the top cover, engages with circular recess around the needle adjuster. Press the cover down against the spring load and screw in the two retaining screws. Do not overtighten.
- (f) Restart the engine and, if necessary, repeat the procedure using finer increments.

Fast Idle Speed Adjustment

- (a) Having established the correct mixture strength the fast idle speed will require minimal adjustment. Ideally this should be approx. 1000 rpm at an ambient temperature of 5-10°C.
- (b) Remove the centre brass plug in the top cover which exposes the adjust screw (5). Using a narrow blade screwdriver, turn clockwise to reduce rpm and anti-clockwise to increase rpm.

Needle Lift Adjustment

This is set to .045" at 20°C (measured when static) and should not need to be touched, except perhaps in the case of an engine having low manifold depression, where it may be desirable to reduce this figure to overcome part warm starting problems. Needle lift is temperature sensitive and ideally should reduce to zero at, or just prior to, the moment of closure of the main valve. The adjust screw (4) for this setting is found under the brass plug at the narrow end of the top cover. There is a hole through the centre of it to allow a 1/16" diameter probe to be inserted when measuring the needle lift. Screw clockwise to reduce needle lift, anti-clockwise to increase lift.

Part Warm Starting Problems

The inability of an engine to restart in the part warm condition is almost invariably caused by over-richness. This can be caused by:

- (a) Too much main valve opening, due to either incorrect initial setting or air leaks into the hot air system preventing temperature rise within the unit.
- (b) Too much needle lift giving excessive cranking enrichment.
- (c) Inability of the engine to generate sufficient manifold depression to pull down the needle diaphragm, due to being excessively worn mechanically or retarded ignition setting.

Single and Dual Type Electric Fuel Pumps

L and HP Type Pumps

The type L and HP pumps are the predecessors of the other single pump designs. The type L is a suction pump intended to be mounted close to the engine, whereas the HP type is designed to be mounted near the fuel tank at the rear of the vehicle.

AUF 200/AZX 1200

The versatile AUF 200/AZX 1200 is the smaller of the current range of SU electric fuel pumps. A compact unit of high pressure design, it incorporates inlet and outlet connections adjustable through 210° to facilitate installation. A venting system allows the pump to be fully sealed.

Normally produced in 12-volt form, it is also available in 6-volt and 24-volt versions and a low pressure version is also produced.

The size and capacity of this pump makes it eminently suitable for use on vehicles in the low and middle power range.

Special features:

- 1) Freedom of installation:
 - Compact dimensions
 - Self-contained unit
 - Adjustable connections
- 2) Rapid priming of float-chamber
- 3) Excellent vapour handling capacity
- 4) Twin tungsten contact breaker points

AUF 300/AZX 1300

The AUF 300/AZX 1300 series pump is a high capacity adaptation of the AUF 200/1200, the pump body having been redesigned to incorporate a flow-smoothing unit and an air bottle.

The flow-smoothing unit consists of a diaphragm and housing situated above the delivery chamber and outlet passage. Fuel pressure pulsations are damped by the air contained in the housing, resulting in a reduction of flow pressure variations and an increase in output for a given rate of operation.

A large compartment formed in the inlet side of the pump acts as an air cushion and smoothes the pressure pulsations of the incoming fuel; it also prevents high negative pressure being created in the pump body.

Special features:

The features are similar to those of the AUF 200/AZX 1200 type, plus:

- 5) High output
- 6) Flow-smoothing on inlet and outlet.

AUF 400/AZX 1400

The extra high capacity AUF 400/AZX 1400 is basically a dual version of the AUF 300/AZX 1300 pump and has a delivery capability of up to 136 litres per hour (30 gallons per hour).

The pump consists of two coil and diaphragm assemblies mounted opposite each other on a common body casting. Separate pumping chambers, with inlet and outlet valves in each, are fed from a common inlet port and fuel is discharged through a common outlet.

The flow-smoothing features of the type AUF 300/AZX 1300 are incorporated in this pump, which has been designed for high pressure applications where the majority of the work is required on the outlet side of the pump.

The standard unit is for use on 12-volt electrical systems but 24-volt versions are also available.

Special features:

- 1) Freedom of installation:
 - Compact dimensions
 - Self-contained unit
 - Venting system available
- 2) Extra high output
- 3) Rapid priming of float-chamber
- 4) Excellent vapour handling capacity
- 5) Twin tungsten contact breaker points with spark suppression

AUF 500/AZX 1500

The AUF 500/AZX 1500 dual pump is similar in construction to the AUF 400/AZX 1400, but is designed to operate as two separate units for those systems having two fuel tanks, or a main and reserve supply. Two inlet ports on the pump body are for connection to the two fuel tanks. Both sides of the pump discharge into the single outlet provided.

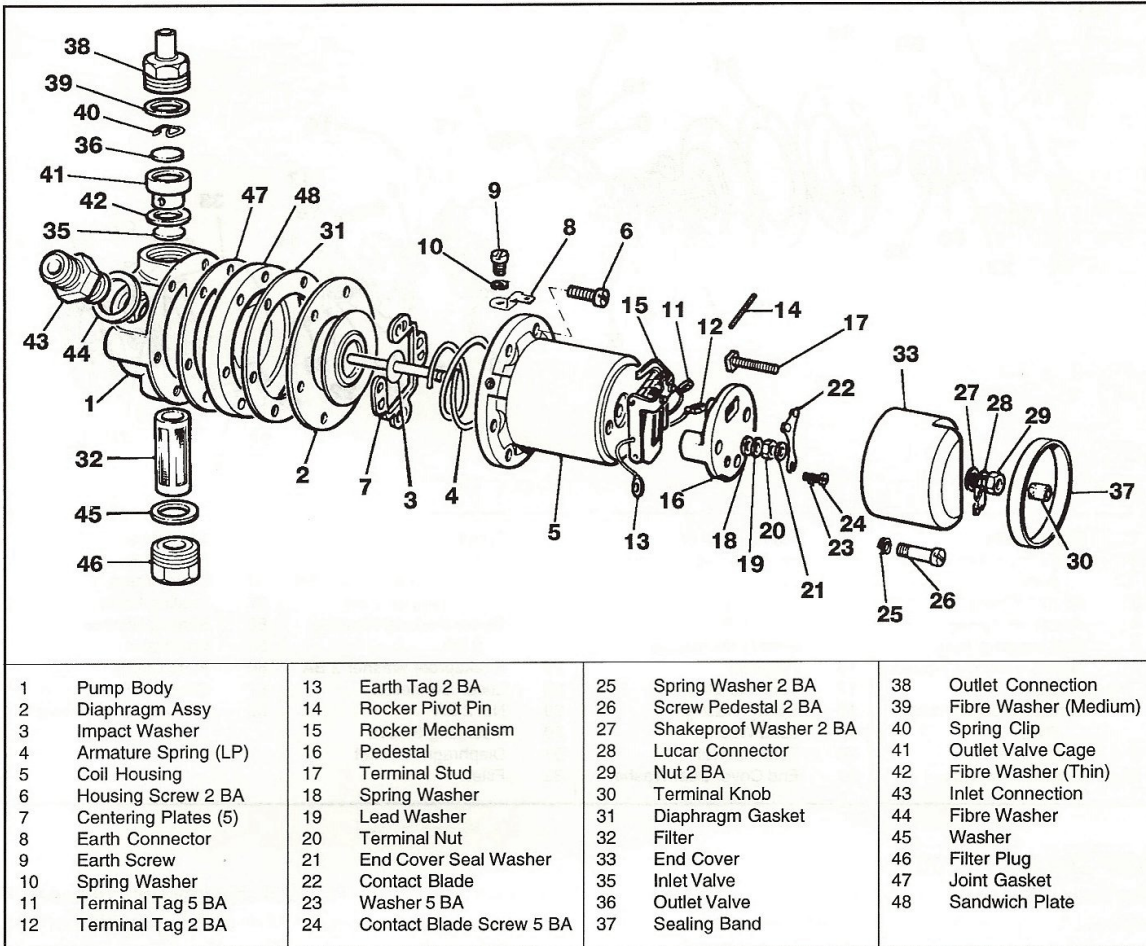
Terminals are provided on each coil assembly for separate connection to the power supply through controls which would normally include a change-over switching arrangement.

Special features:

- 1) Freedom of installation:
 - Compact dimensions
 - Self-contained unit
 - Venting system available
- 2) Rapid priming of float-chamber
- 3) Excellent vapour handling capacity
- 4) Twin tungsten contact breaker points with spark suppression
- 5) Dual inlet connections
- 6) Common outlet connection

Single Type Electric Fuel Pumps

The pump comprises three main assemblies: the body casting, the diaphragm, armature and magnet assembly, and the contact breaker assembly.

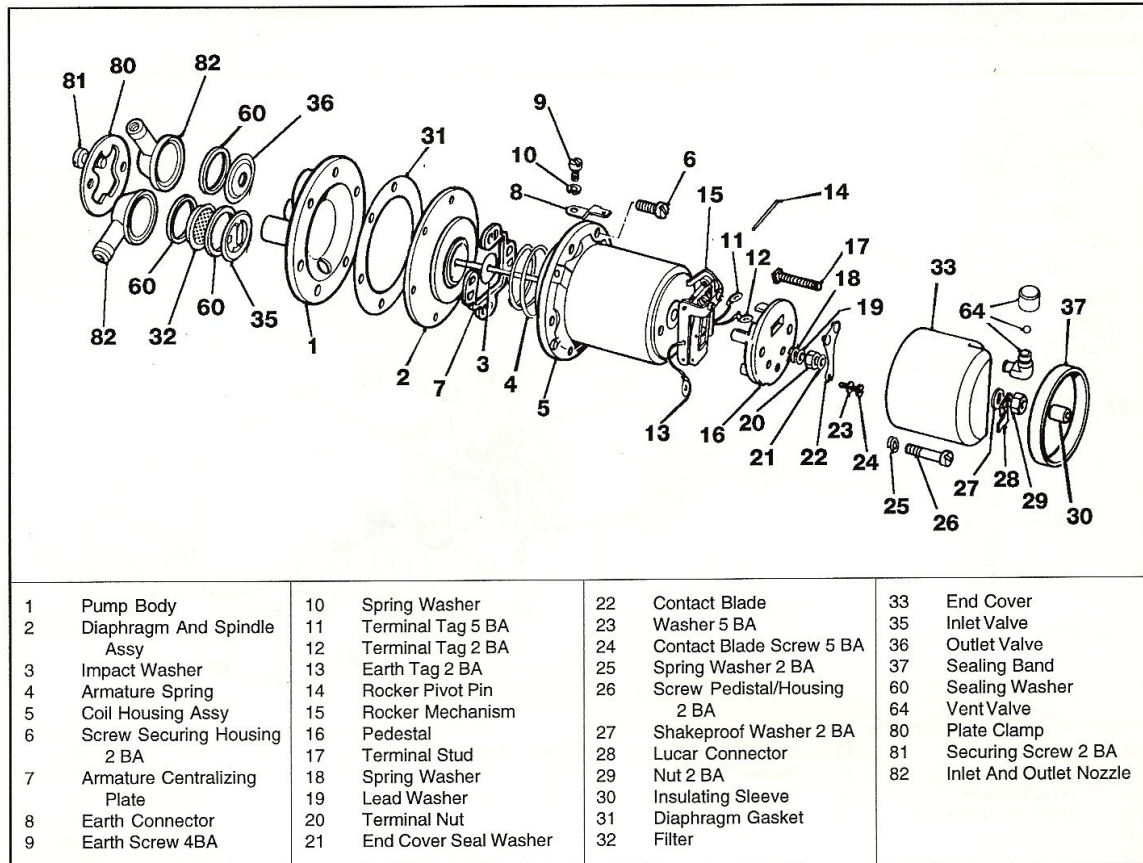


The Body L and HP Type Pumps

The body (1) consists of a casting and a sandwich plate (48) which is assembled to it together with a joint gasket (47). A filter (32) is screwed into the lower part of the body, and the inlet union (43) is screwed in at an angle on one side. The outlet union (38) is screwed into the top of the body, opposite to the filter, and tightens down onto the delivery valve cage (41), which is clamped between two fibre washers, thin (42) and medium (39). In the top of the

cage is the outlet valve, a thin brass disc (36) held in position by a spring clip (40). The inlet valve (35), a similar brass disc, rests on a seating machined in the body. A series of holes connects the space between the valves to the pumping chamber which is a shallow depression on the face of the sandwich plate, bounded by the diaphragm assembly.

Single Type Electric Fuel Pumps

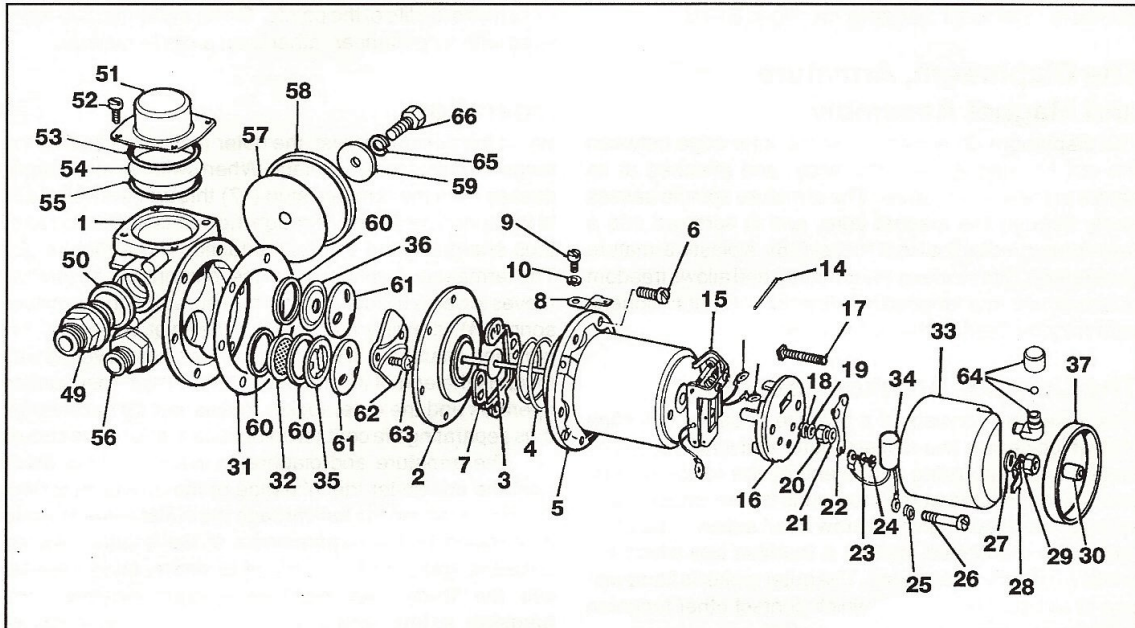


AUF 200/AZX 1200

The body (1) is a casting into which the clamp plate (80), retained by two screws (81), holds the inlet and outlet moulded nozzles (82) and both valve assemblies, all of which are arranged to be accessible from the outside of the pump. The inlet valve (35) consists of a thin plastic disc permanently assembled into a pressed steel cage. The

outlet valve (36) is an identical assembly, but reversed in direction. A dome-shaped filter (32) is provided on the entry side of the inlet valve. The valve allows passage to the pumping chamber - a shallow depression formed in the face of the body casting and bounded by the diaphragm.

Single Type Electric Fuel Pumps



1	Pump Body	15	Rocker Mechanism	30	Insulating Sleeve	56	Inlet Nozzle
2	Diaphragm & Spindle Assy	16	Pedestal	31	Diaphragm Gasket	57	Joint, Inlet Air Bottle Cover
3	Impact Washer	17	Terminal Stud	32	Filter	58	Cover, Inlet Air Bottle
4	Armature Spring	18	Spring Washer	33	End Cover	59	Dished Washer
5	Coil Housing Assy	19	Lead Washer	34	Diode Resistor	60	Sealing Washer
6	Housing Screw 2 BA	20	Terminal Nut	35	Inlet Valve	61	Valve Cap
7	Centering Plates (5)	21	End Cover Seal Washer	36	Outlet Valve	62	Clamp Plate
8	Earth Connector	22	Contact Blade	37	Sealing Band	63	Plate Screw
9	Earth Screw	23	Washer 5 BA	49	Outlet Nozzle	64	Vent Valve
10	Spring Washer	24	Contact Blade Screw 5 BA	50	Fibre Washer	65	Spring Washer
11	Terminal Tag 5 BA	25	Spring Washer 2 BA	51	Cover	66	Screw, Securing Washer
12	Terminal Tag 2 BA	26	Screw Pedestal 2 BA	52	Screw, Securing Cover		
13	Earth Tag 2 BA	27	Shakeproof Washer 2 BA	53	Rubber O Ring		
14	Rocker Pivot Pin	28	Lucar Connector	54	Plastic Diaphragm Barrier		
		29	Nut 2 BA	55	Sealing Washer		

AUF 300/AZX 1300

The main fuel inlet (56) is in communication with an inlet air bottle (flow-smoother), and connection to the main pumping chamber is provided by the inlet valve assembly (65). This comprises a plastic valve disc permanently assembled within a pressed-steel cage, which is held in place by a valve cover (61). The outlet from the pumping chamber is provided with an identical valve assembly (36) reversed in direction. A clamp plate (62) secured by self-tapping screws (63) holds both inlet and outlet valve assemblies in position: the valves may be removed by releasing the clamp plate screws. A filter (32) is provided as shown - on the entry side of the inlet valve assembly.

The outlet flow-smoothing device is fitted across the extremity of the delivery chamber which communicates with the outlet union (49). The outlet smoothing device assembly consists of a flexible plastic diaphragm (54) contained between the domed cover and the outlet chamber.

The inlet valve (65) allows passage to the pumping chamber which is formed by a shallow depression in the body casting and bounded by the diaphragm (2).

Single Type Electric Fuel Pumps

Numbers refer to all diagrams on pages 61-63.

The Diaphragm, Armature and Magnet Assembly

The diaphragm (2) is clamped at its outer edge between the coil housing (5) and the body, and attached at its centre to the iron armature. The armature spindle passes freely through the magnet core, and is screwed into a trunnion carried by the inner rocker (15). A plastic armature guide plate (7) centralises the armature and allows freedom of movement in a longitudinal direction. An atmospheric vent may be fitted to the coil housing.

The Contact Breaker Assembly

This assembly consists of a bakelite pedestal moulding (16) which carries two rockers, outer and inner (15), both hinged to the moulding at one end by the rocker spindle and interconnected at their top ends by two small toggle springs arranged to give a 'throw over' action. The inner rocker, as mentioned, carries a trunnion into which the armature spindle is screwed. The outer rocker is fitted with one or two tungsten points which contact other tungsten points carried by the spring blade (22).

One end of the coil (5) is connected electrically to the spring blade and the other end is connected to the terminal stud (17). A short length of flexible wire (13) connects the outer rocker to one of the screws securing the pedestal moulding to the coil housing, thus providing an earth return. This wire must then be thoroughly earthed to the body or chassis of the vehicle via the earthing screw (9). A non-return valve (64) may be fitted to the end-cover moulding (33) to aid the circulation of air through the contact-breaker chamber. A diode-resistor (34), where fitted, is in parallel with the points as a spark suppressor

to increase the life of the points. Some earlier models were fitted with a condenser rather than a diode resistor.

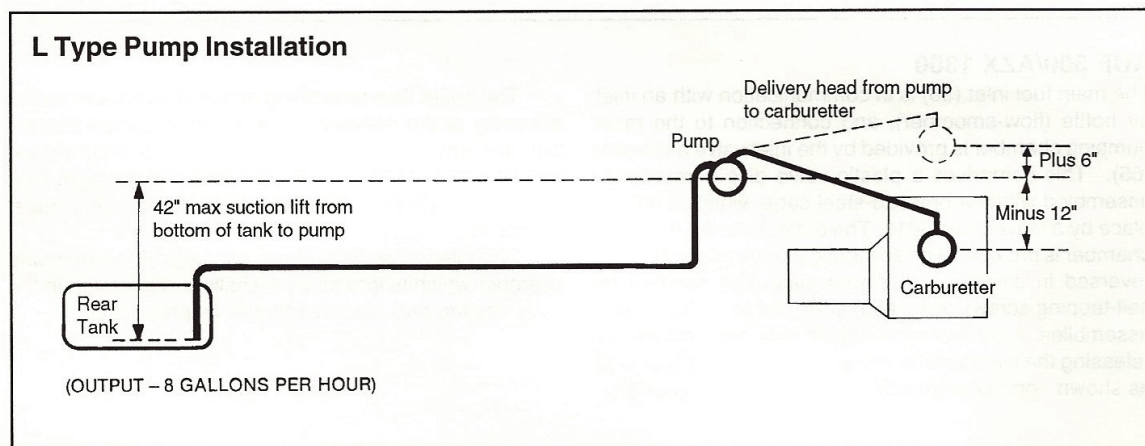
Operation

When the pump is at rest, the outer rocker lies so that the tungsten points make contact. When switched on, current passes from the terminal stud (17) through the coil, back to the spring blade (22), through the points and so to earth, thus energizing the coil and attracting the armature (2). The armature, together with the diaphragm assembly, moves towards the coil, against pressure from the armature spring (4), drawing fuel through the inlet valve into the pumping chamber. When the armature has travelled well towards the end of its stroke the 'throw over' mechanism operates and the outer rocker moves rapidly backwards, thus separating the contact points and breaking the circuit.

The armature and diaphragm will now move away from the coil under the influence of the armature spring, thereby expelling the fuel through the outlet valve at a rate determined by the requirements of the engine. As the armature approaches the end of its stroke, away from the coil, the 'throw over' mechanism again operates, the tungsten points re-make contact, and the cycle of operations is repeated.

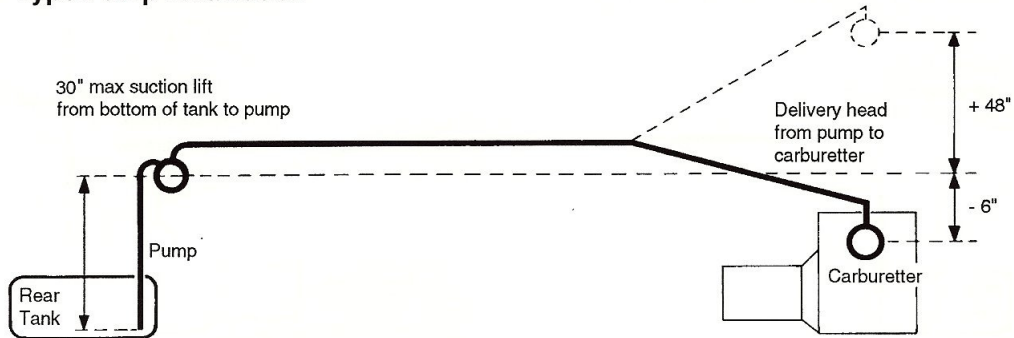
Installation

Where pumps with vents are used, the vent should be piped to a region of dry air, for example the car interior or luggage compartment. The following diagrams give typical installation configurations.



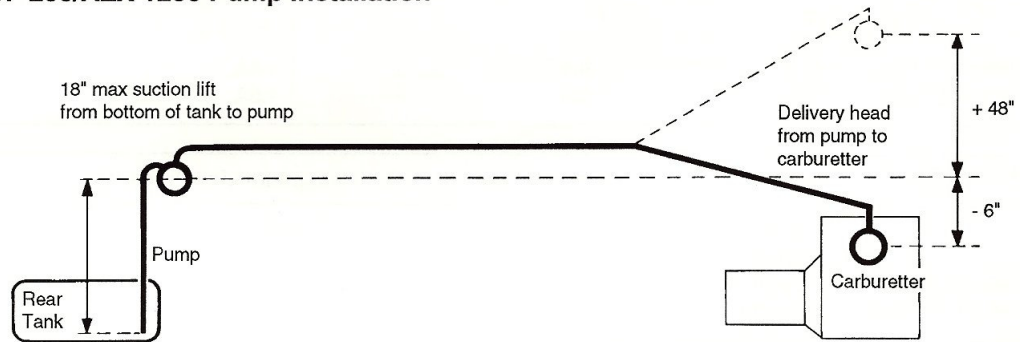
Single Type Electric Fuel Pumps

HP Type Pump Installation



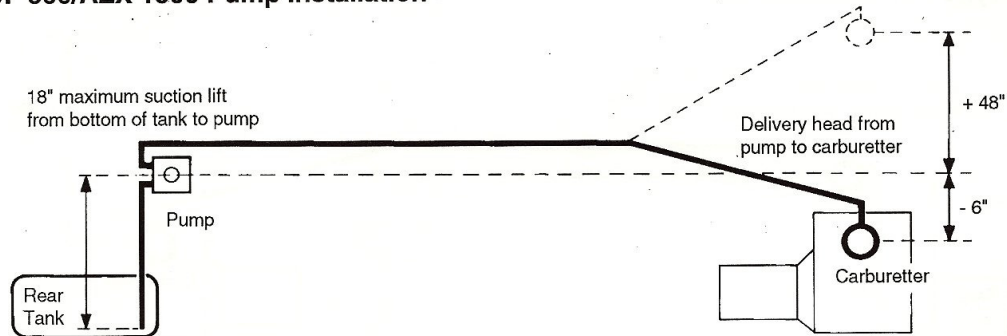
The type HP pump, because of its high delivery pressure, is very suitable for mounting over the rear fuel tank, in which position it is also free from vaporising troubles arising from high under-bonnet temperatures.

AUF 200/AZX 1200 Pump Installation



Single Type Electric Fuel Pumps

AUF 300/AZX 1300 Pump Installation



Performance

Type	Voltage	Minimum Voltage*	Current at Minimum Voltage
L	12		
HP	12		
AUF 200/AZX 1200	13.5	9.5	1.5A
AUF 300/AZX 1300	13.5	9.5	1.5A

Type	Capacity	Bore of Pipe	Maximum Line Pressure
L	8 gal/hr	0.25"	1.5 lb/in ²
HP	7 gal/hr	0.25"	2-3.8 lb/in ²
AUF 200/AZX 1200	7 gal/hr	0.25"	2.7 lb/in ²
AUF 300/AZX 1300	15 gal/hr	0.312"	2.7/3.8 lb/in ²

*9.5V is the minimum starting voltage for pumps with standard coils. Some pump specifications use alternative coils which offer reduced minimum starting voltage.

Dual Type Electric Fuel Pumps

With the exception of the inlet valve arrangement and the external wiring, the two types of dual electric pump are of similar general construction.

Each pump comprises three main assemblies: the body assembly (1 off), diaphragm, armature and magnet assembly (2 off) and the contact breaker assembly (2 off). All numbers refer to the diagram on page 63.

The Body

AUF 400/AZX 1400 Type

The inlet union (49) has uninterrupted communication with an inlet air bottle as a flow-smoothing aid. Both pumping chambers are fed from this inlet and pump fuel to a common delivery chamber.

AUF 500/AZX 1500 Type

The body (1) is a die-casting into which the main inlet union (49) is screwed; this is connected to one side of a divided compartment which is in communication with an inlet air bottle separated from the corresponding inlet air bottle which serves the second inlet connection. The delivery chamber is common to both primary and secondary delivery.

Both Types

The delivery chamber is bounded by a flexible plastic diaphragm (54), separating it from a sealed volume of air contained in the air bottle cover (51) and sealed by the O ring (53). The inlet valve assembly (35) comprises a plastic disc permanently assembled in a pressed-steel cage with a dome-shaped filter (32) provided on its entry side. The outlet valve (36) is an identical assembly, but reversed in direction. Both valves are held in position by valve covers (61) and retained by a clamp plate (62) with two self-tapping screws (63). The inlet valve (35) allows passage to the pumping chamber formed by a shallow depression in the body casting and bounded by the diaphragm (2).

The Diaphragm, Armature and Magnet Assembly

The diaphragm (2) is clamped at its outer edge between the coil housing (5) and the body, and attached at its centre to the iron armature. The armature spindle passes freely through the magnet core, and is screwed into a trunnion carried by the inner rocker (15). A plastic armature guide plate (7) centralises the armature and allows freedom of movement in a longitudinal direction. An atmospheric vent may be fitted to the coil housing.

The Contact Breaker Assembly

This assembly consists of a bakelite pedestal moulding (16) which carries two rockers, outer and inner (15), both hinged to the moulding at one end by the rocker spindle and interconnected at their top ends by two small toggle springs arranged to give a 'throw over' action. This inner rocker, as mentioned, carries a trunnion into which the armature spindle is screwed. The outer rocker is fitted with one or two tungsten points which contact other tungsten points carried by the spring blade (22).

One end of the coil (5) is connected electrically to the spring blade and the other end is connected to the terminal stud (17). A short length of flexible wire connects the outer rocker to one of the screws securing the pedestal moulding to the coil housing, thus providing an earth return. This tag must then be thoroughly earthed to the body or chassis of the vehicle via the earthing screw (9). A non-return valve (64) may be fitted to the end-cover moulding (33) to aid the circulation of air through the contact-breaker chamber. A diode-resistor (34), where fitted, is in parallel with the points as a spark suppressor to increase their life. Some earlier models were fitted with a condenser rather than a diode-resistor.

Operation

When the pump is at rest the outer rocker lies so that the tungsten points make contact. When switched on, current passes from the terminal stud (17) through the coil, back to the spring blade (22) through the points and so to earth, thus energizing the coil and attracting the armature (2). The armature, together with the diaphragm assembly, moves towards the coil, against pressure from the armature spring (4), drawing fuel through the inlet valve into the pumping chamber. When the armature has travelled well towards the end of its stroke the 'throw over' mechanism operates and the outer rocker moves rapidly backwards, thus separating the contact points and breaking the circuit.

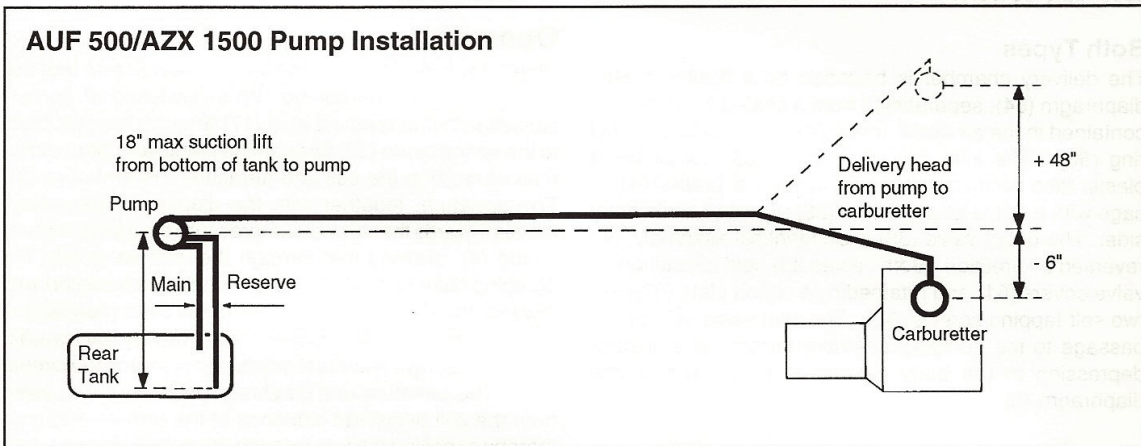
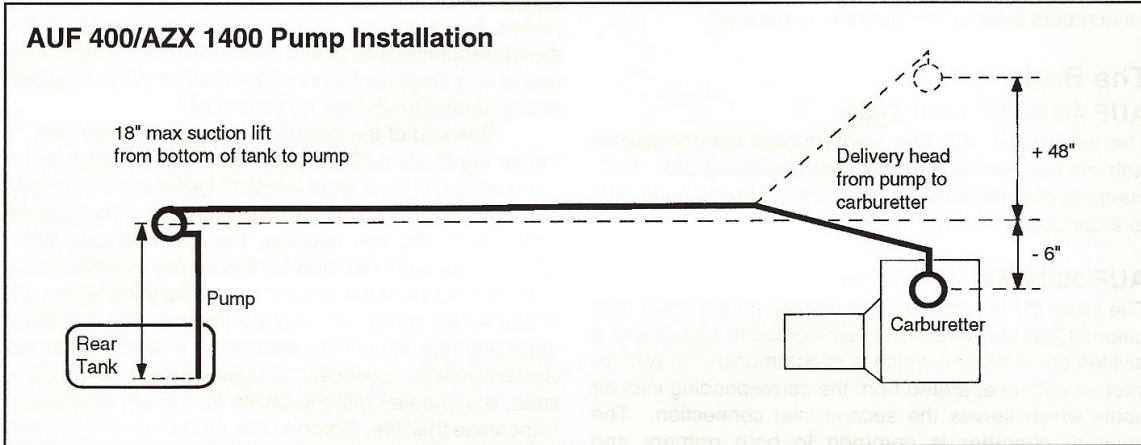
The armature and diaphragm will now move away from the coil under the influence of the armature spring, thereby expelling the fuel through the outlet valve at a rate determined by the requirements of the engine. As the armature approaches the end of its stroke, away from the coil, the 'throw over' mechanism again operates, the tungsten points re-make contact, and the cycle of operations is repeated.

Dual Type Electric Fuel Pumps

Installation

Dual electrical pumps, because of their high delivery pressure, are very suitable for mounting over the rear fuel tank, in which position they are also free from vaporizing troubles due to high under-bonnet temperatures.

The coil housing vent connector and end cover vent (where fitted) should be piped to a region of dry air, for example the car interior or luggage compartment. The following diagrams give typical installation configurations.



Performance

Type	Voltage	Minimum Voltage*	Current at Minimum Voltage
AUF 400/AZX 1400	13.5	9.5	1.5A
AUF 500/AZX 1500	13.5	9.5	1.5A

Type	Capacity	Bore of Pipe	Maximum Line Pressure
AUF 400/AZX 1400	30 gal/hr	0.312"	2.7/3.8 lb/in ²
AUF 500/AZX 1500	12.5 gal/hr	0.312"	2.7/3.8 lb/in ²

*9.5V is the minimum starting voltage for pumps with standard coils. Some pump specifications use alternative coils which offer reduced minimum starting voltage.

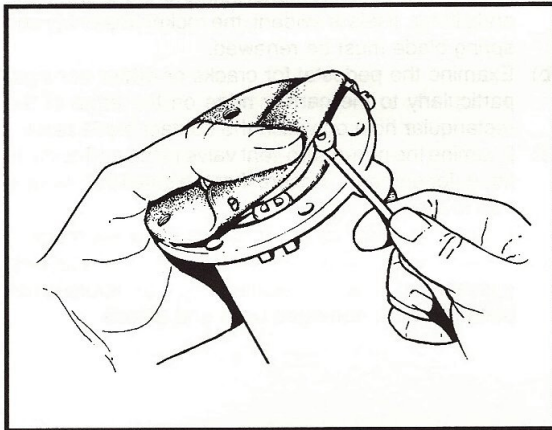
Electric Fuel Pump: Dismantling

For location of all components, refer to the explosion diagrams on pages 61-63.

Contact Breaker

- (a) Remove the insulating sleeve, terminal nut and connector, together with its shakeproof washer. Remove the tape seal (if fitted) and take off the end cover.
- (b) Unscrew the 5 BA screw which holds the contact blade to the pedestal. This will allow the washer, the long coil lead and the contact blade to be removed.

Coil Housing and Diaphragm



- (a) Unscrew the coil housing securing screws using a screwdriver with a well-fitting blade to avoid damaging the screw heads.
- (b) Remove the earthing screw.
- (c) The coil housing may now be removed from the body. Next turn back the edge of the diaphragm assembly and remove the armature guide plate from the coil recess by gently probing the two end lobes free from the coil recess.
- (d) Now remove the diaphragm and spindle assembly by taking hold of the diaphragm and unscrewing it anti-clockwise until the armature spring pushes the diaphragm away from the coil housing.

Pedestal and Rocker

- (a) Remove the end-cover seal washer, unscrew the terminal nut and remove the lead washer; this will have flattened on the terminal tag and thread and is best cut away with cutting pliers or a knife.
- (b) Unscrew the 2 BA screws, holding the pedestal to the coil housing and remove the earth terminal tag.
- (c) Tip the pedestal and withdraw the terminal stud from the terminal tag. The pedestal may now be removed with the rocker mechanism attached.
- (d) Push out the hardened steel pin which holds the rocker mechanism to the pedestal and separate the two parts.
- (e) **Dual Type:** Repeat these operations on the other pump unit.

Body and Valves

- (a) **L and HP Types:** Remove the inlet union, then the outlet union, the outlet valve cage and the inlet valve disc. Remove the base plug and filter.
- (b) **AUF 200/AZX 1200:** Unscrew the 2 BA screws securing the spring clamp plate which holds the inlet and outlet nozzles. Remove the nozzles, filter and valve assemblies.
- (c) **AUF 300/AZX 1300:** Undo the two screws securing the valve clamp plate, remove the valve caps, valves, sealing washers and the filter.
- (d) **Dual Type:** Unscrew the four Philips screws securing the valve clamp plates, remove the valve caps, valves, sealing washers and filter.

Note: Dismantling of the delivery flow smoothing device should only be undertaken if the operation of it is faulty, and if the necessary equipment for pressure-testing after assembly is available. On this understanding proceed as follows:

- (e) Remove the four 4 BA screws securing the delivery flow smoothing device cover.
- (f) Remove the cover, rubber O ring, barrier and sealing washer.
- (g) Remove the single 2 BA screw securing the inlet air bottle cover. Remove the cover and gasket, then unscrew and inlet and outlet connections.

Electric Fuel Pump: Inspection

L and HP Types

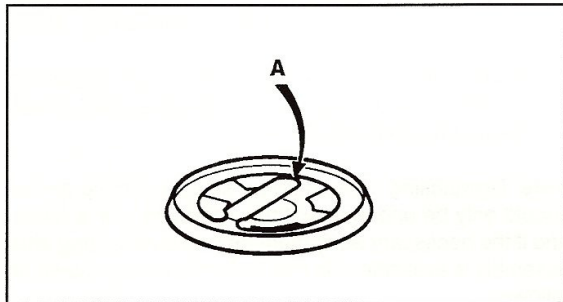
- (a) Clean the pump and inspect for cracks, damaged joint faces and threads.
- (b) Remove the circlip in the outlet valve cage and examine the inlet and outlet valve discs for wear. Replace if worn.
- (c) Examine the valve seat in the body and outlet valve cage for damage and corrosion. If it is impossible to remove the corrosion, or if the seat is pitted, the body or cage must be discarded.
- (d) Clean the filter with a brush, examine for fractures and renew if necessary.

All Other Types

If gum formation has occurred in the fuel used in the pump, the parts in contact with the fuel will have become coated with a substance similar to varnish. This has a strong stale smell and may attack the neoprene diaphragm. Parts so affected may be cleaned by the use of a suitable solvent.

1

Clean the pump and inspect for cracks, damaged joint faces and threads.



2

- (a) Examine the plastic valve assemblies for kinks or damage to the valve plates. They can best be checked by blowing and sucking with the mouth.
- (b) Check that the narrow tongue A on the valve cage (which is bent over to retain the valve and to prevent it being forced out of position) has not been distorted but allows a valve lift of approximately 1.6mm (1/16").

3

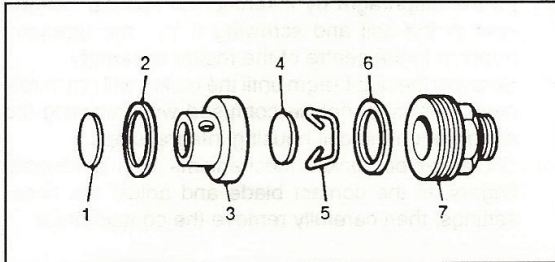
- (a) Examine the valve recesses in the body for damage and corrosion; if it is impossible to remove the corrosion, or if the seat is pitted, the body must be discarded.
- (b) Ensure that the coil housing vent tube is not blocked.
- (c) Clean the filter with a brush and examine for fractures. Renew if necessary.
- (d) Examine the coil lead tag for security and the lead insulation for damage.

4

- (a) Examine the contact breaker points for signs of burning and pitting. If this is evident, the rocker assembly and spring blade must be renewed.
- (b) Examine the pedestal for cracks or other damage, particularly to the narrow ridge on the edge of the rectangular hole on which the contact blade rests.
- (c) Examine the non-return vent valve in the end cover (if fitted) for damage. Ensure that the small ball valve is free to move.
- (d) Examine all diaphragms for signs of deterioration.
- (e) Renew the following parts: All fibre and cork washers, gaskets and O section sealing rings, armature guide plate (if worn), damaged bolts and unions.

Electric Fuel Pump: Reassembly

L and HP Types



1

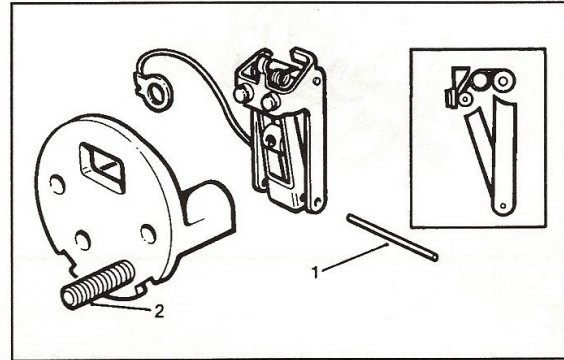
- (a) Assemble the brass valve disc (4) to the outlet valve cage (3), making sure that the smooth face of the disc faces the valve seat.
- (b) Retain the disc in position with the circlip (5) which must be located in the groove in the valve cage. The valve must rattle freely when the valve cage is shaken.
- (c) Drop the other valve disc (1) smooth face downwards onto the inlet valve seat in the body of the pump.
- (d) Inset the thin fibre washer (2), drop the valve cage (3) in position, insert the medium fibre washer (6) then screw in the outlet union (7) and tighten with a 3/8 inch Whitworth ring or box spanner.
- (e) Fit the outlet union.

2

- (a) Place the sandwich plate gasket onto the face of the body, lining up the holes in the body and gasket. Fit the sandwich plate, concave face to diaphragm together with the diaphragm gasket, again lining up the holes.
- (b) Offer up the coil housing to the body and sandwich plate and ensure correct seating between them. Outlet connection to the top and filter plug at the bottom.
- (c) Line up the six securing screw holes, making sure that the two cast lugs on the coil housing are at the bottom. Inset the six 2 BA screws finger-tight. Fit the earthing screw with its Lucar connector.
- (d) Tighten the securing screws in sequence as they appear diametrically opposite each other.

All Other Types

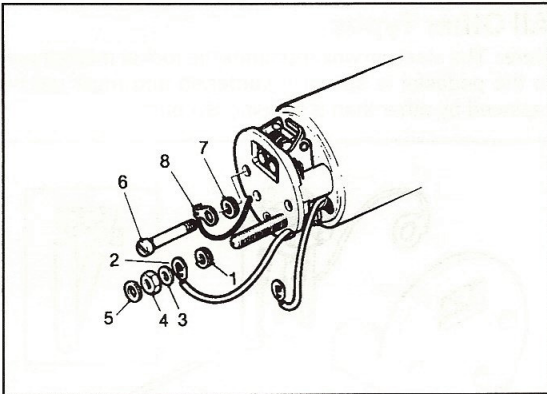
Note: The steel pin which secures the rocker mechanism to the pedestal is specially hardened and must not be replaced by other than a genuine SU part.



1

- (a) Invert the pedestal and fit the rocker assembly to it by pushing the steel pin (1) through the small holes in the rockers and pedestal struts.
- (b) Then position the centre toggle so that, with the inner rocker spindle in tension against the rear of the contact point, the centre toggle spring is above the outer rocker spindle (as in insert).
- (c) This positioning is important to obtain the correct 'throw-over' action; it is also essential that the rockers are perfectly free to swing on the pivot pin and that the arms are not binding on the legs of the pedestal.
- (d) If necessary the rockers can be squared up with a pair of thin-nosed pliers.
- (e) Assemble the square-headed 2 BA terminal stud (2) to the pedestal, the back of which is recessed to take the square head.

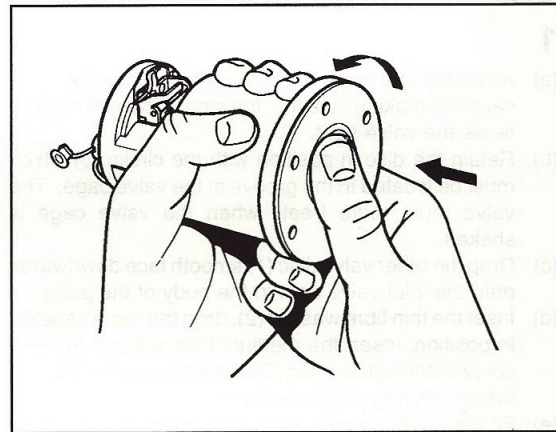
Electric Fuel Pump: Reassembly



- (b) Before fitting the diaphragm, make sure that the impact washer (1) is fitted to the armature. (This is a small neoprene washer that fits in the coil recess.) Do not use jointing compound or dope on the diaphragm.
- (c) Fit the diaphragm by inserting the spindle into the hole in the coil and screwing it into the threaded trunnion in the centre of the rocker assembly.
- (d) Screw in the diaphragm until the rocker will not 'throw over'; this must not be confused with jamming the armature on the coil housing integral steps.
- (e) On later-type rocker mechanisms with adjustable fingers, fit the contact blade and adjust the finger settings, then carefully remove the contact blade.

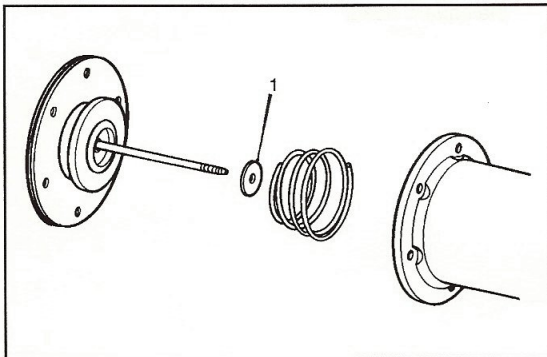
2

- (a) Assemble the 2 BA spring washer (1) and put the terminal stud through 2 BA terminal tag (2), then fit the lead washer (3) and the coned nut with its coned face to the lead washer. (This makes better contact than an ordinary flat washer and nut.)
- (b) Tighten the 2 BA nut and finally add the end-cover seal washer (5).
- (c) Assemble the pedestal to the coil housing (see figure 2) by fitting the two 2 BA pedestal screws (6), and ensure that the spring washer (7) on the left-hand screw (9 o'clock position) is between the pedestal and the earthing tag (8).
- (d) Tighten the screws, taking care to prevent the earthing tag (8) from turning, as this will strain or break the earthing flex. Do not overtighten the screws or the pedestal will crack.
- (e) **Do not fit the contact blade at this stage.**



4

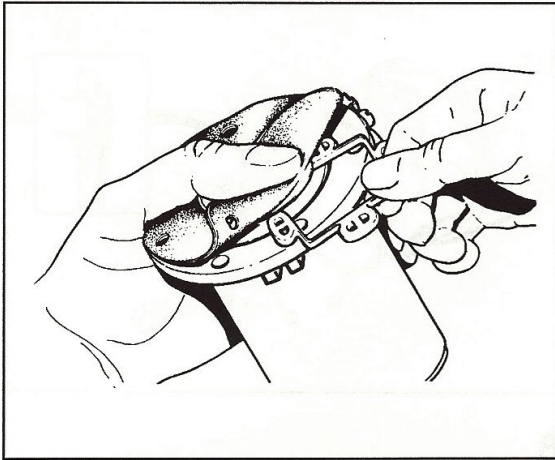
- (a) Holding the coil housing assembly in the left hand in an approximately horizontal position, push the diaphragm spindle in with the thumb of the right hand, pushing firmly but steadily.
- (b) Unscrew the diaphragm, pressing and releasing with the thumb of the right hand until the rocker just 'throws over'.
- (c) Now turn the diaphragm back (unscrew) to the nearest hole and again a further four holes (two-thirds of a complete turn). The diaphragm is now correctly set.



3

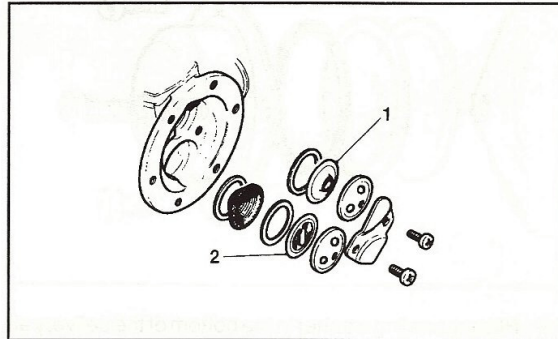
- (a) Place the armature spring into the coil housing with its large diameter towards the coil.

Electric Fuel Pump: Reassembly



- (a) Place the outlet valve assembly (tongue-side uppermost) in the recess marked 'outlet'. Place a joint washer on top of the valve assembly and complete this part of the assembly by adding the outlet nozzle.
- (b) Place the inlet valve assembly (tongue-side downwards) in the recess marked 'inlet'. Follow this with a joint washer, then the filter (dome side upwards), then another joint washer, completing the assembly with the inlet nozzle.
- (c) Take care that both assemblies settle down evenly into their respective recesses. Position the nozzles as required, place the clamp plate on top, and tighten down firmly onto the body with the two 2 BA screws.

AUF 300/AZX 1300 and Dual Types Only

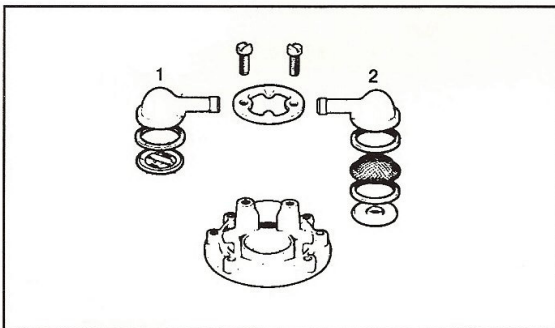


5

- (a) Fit the armature guide plate, flat face towards the diaphragm, by turning back the diaphragm edge and inserting an end lobe into the recess between the armature and the coil housing.
- (b) Follow this process until all four lobes are approximately in position, then press each lobe firmly home finishing with the two end ones. The latter instruction is important in order to avoid distortion of the connecting arms between the lobes.

6

AUF 200/AZX 1200 Type Only



In this range of pumps, the inlet (2) and outlet (1) valves are identical assemblies and are held in position in the one-piece body casting by a steel spring clamp plate secured by two 2 BA screws. This plate also secures the inlet and outlet nozzles, including the filter, all of which are arranged to be accessible from the outside of the pump. The inlet recess is deeper than the outlet to allow for the filter and extra washer.

In this range of pumps the valve assemblies are retained internally in the body by a clamp plate secured with self-tapping screws. The inlet valve (2) recess in the body is deeper than the outlet (1) recess to allow for the filter and the extra washer.

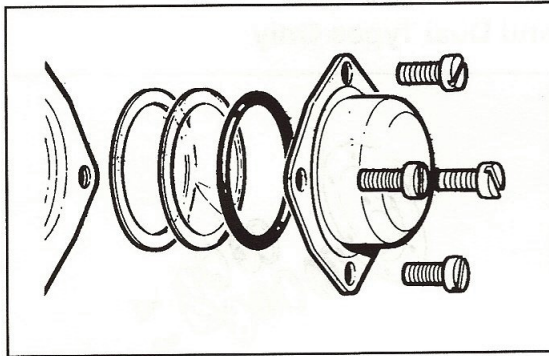
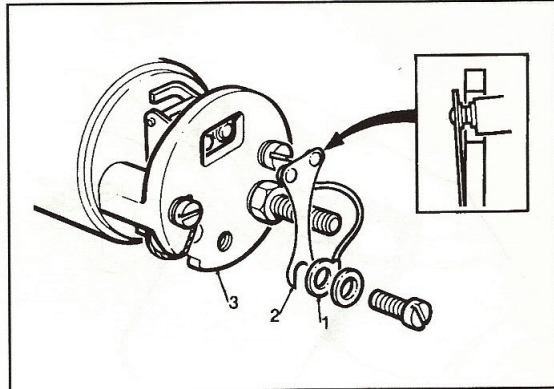
Another feature of these pumps is the incorporation of an air bottle on the inlet and a flow-smoothing device on the delivery side.

The inlet air bottle is a chamber in the body casting blanked off by a simple cover and joint washer held in place by a single screw.

The delivery air bottle is formed by a flexible plastic diaphragm, separating the delivery chamber in the body from a sealed volume of air contained in the air bottle cover. This cover is secured by four screws and sealed by an O section sealing ring and joint washer.

Electric Fuel Pump: Reassembly

- (a) Screw in the inlet and outlet connections together with their sealing rings. Assemble the outlet valve components into the outlet recess in the following order: first a joint washer, and then the valve (tongue-side downwards), then the valve cap.
- (b) Assemble the inlet valve into the inlet recess as follows: first a joint washer, then the filter (dome side downwards), then another joint washer, followed by the valve assembly (tongue-side upwards), then the valve cap. Take care that both valve assemblies settle down into their respective recesses. Place the clamp plate on top and tighten down firmly to the bottom with the two (four in dual types) screws.
- (c) Replace the inlet air bottle cover with its joint washer and tighten down the central screw.



- (d) Place a sealing washer in the bottom of the delivery air bottle recess. Place the plastic diaphragm (dome side downwards) then add the O section sealing ring and tighten down the cap with its four screws.
- (e) The pump should be pressure-tested after disturbance of the delivery air bottle.

7

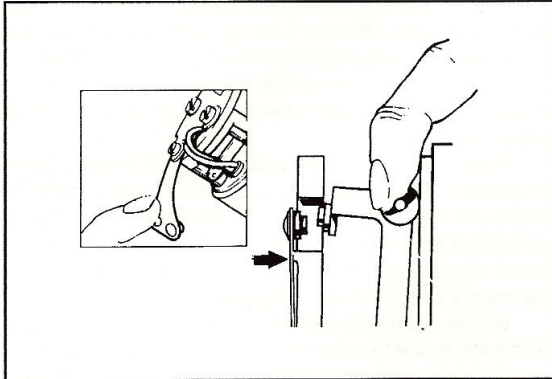
All types

- (a) Fit the joint washer to the body, aligning the screw holes. Offer up the coil housing to the body, ensuring correct seating between them.
- (b) Line up the six securing screw holes, making sure that the cast lugs on the coil housing are at the bottom. Insert the six 2 BA screws finger-tight.
- (c) Fit the earthing screw with its Lucar connector.
- (d) Tighten the securing screws in sequence as they appear diametrically opposite each other.
- (e) **Dual Types:** Repeat these operations on the other coil housing.

8

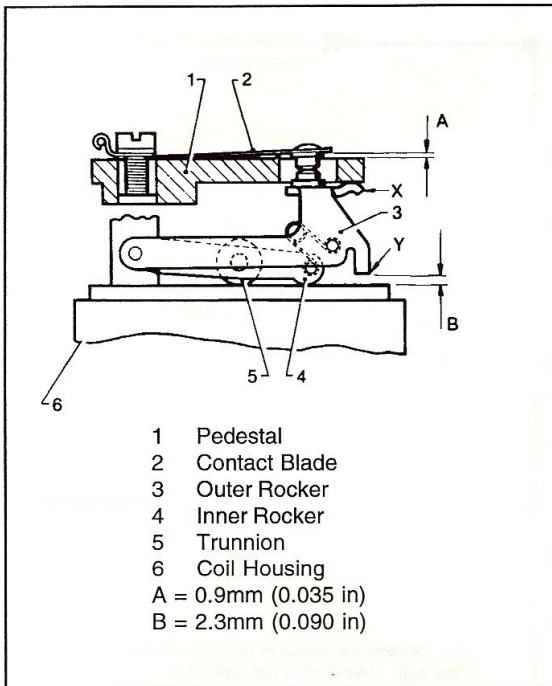
- (a) Fit the contact blade (2) and coil lead (1) to the pedestal (3) with the 5 BA washer and screw. Where a diode resistor is fitted it is in parallel with the coil connections. This component is polarity conscious and therefore all connections must be correctly made. A condenser, where fitted, is not polarity conscious.
- (b) Adjust the contact blade so that the contact points on it are a little above the contact points on the rocker when the points are closed, also that when the contact points make or break, one pair of points wipes over the centre line of the other in a symmetrical manner. As the contact blade is provided with a slot for the attachment screw, some degree of adjustment is possible.
- (c) Tighten the contact blade attachment screw when the correct setting is obtained.

Electric Fuel Pump: Reassembly



9

- (a) Check that when outer rocker is pressed onto the coil housing, the contact blade rests on the narrow rib or ridge which projects slightly above the main face of the pedestal. If it does not, slacken the contact blade attachment screw, swing the blade clear of the pedestal, and bend it downwards a sufficient amount so that when repositioned it rests against the rib lightly. Over-tensioning of the blade will restrict the travel of the rocker mechanism.



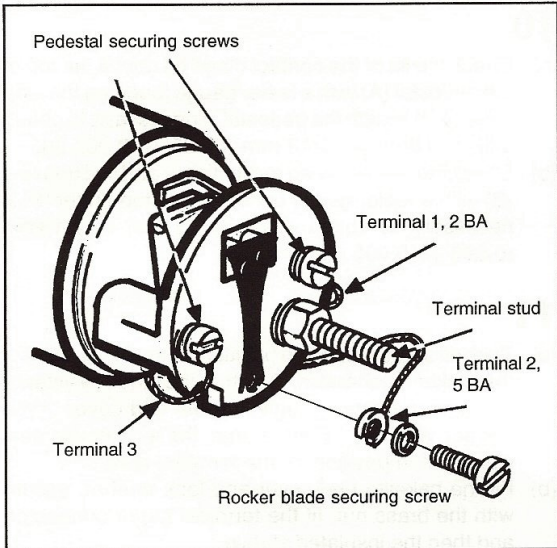
10

- (a) Check the lift of the contact blade tip above the top of the pedestal (A) with a feeler gauge, bending the stop finger 'X' beneath the pedestal, if necessary, to obtain a lift of 0.9mm +/- 0.13 mm (0.035 +/- 0.005 in).
- (b) Check the gap between rocker finger and coil housing (B) with a feeler gauge bending the stop-finger 'Y', if necessary, to obtain a gap of 2.3 mm +/- 0.13mm (0.090 +/- 0.005 inch).

11

- (a) Tuck all spare cable into position so that it cannot foul the rocker mechanism. See that the diode resistor or condenser is fitted snugly into the end cover at the correct attitude. Ensure that the end-cover seal washer is in position on the terminal stud.
- (b) Fit the bakelite end-cover and lock washer, secure with the brass nut, fit the terminal tag or connector, and then the insulated sleeve.
- (c) The pump is now ready for test.
- (d) After test replace the rubber sealing band over the end cover gap and seal with adhesive tape. This may be removed to improve ventilation when the pump is mounted internally in a moisture-free region but must be retained otherwise.

Electric Fuel Pump: Electrical Connections

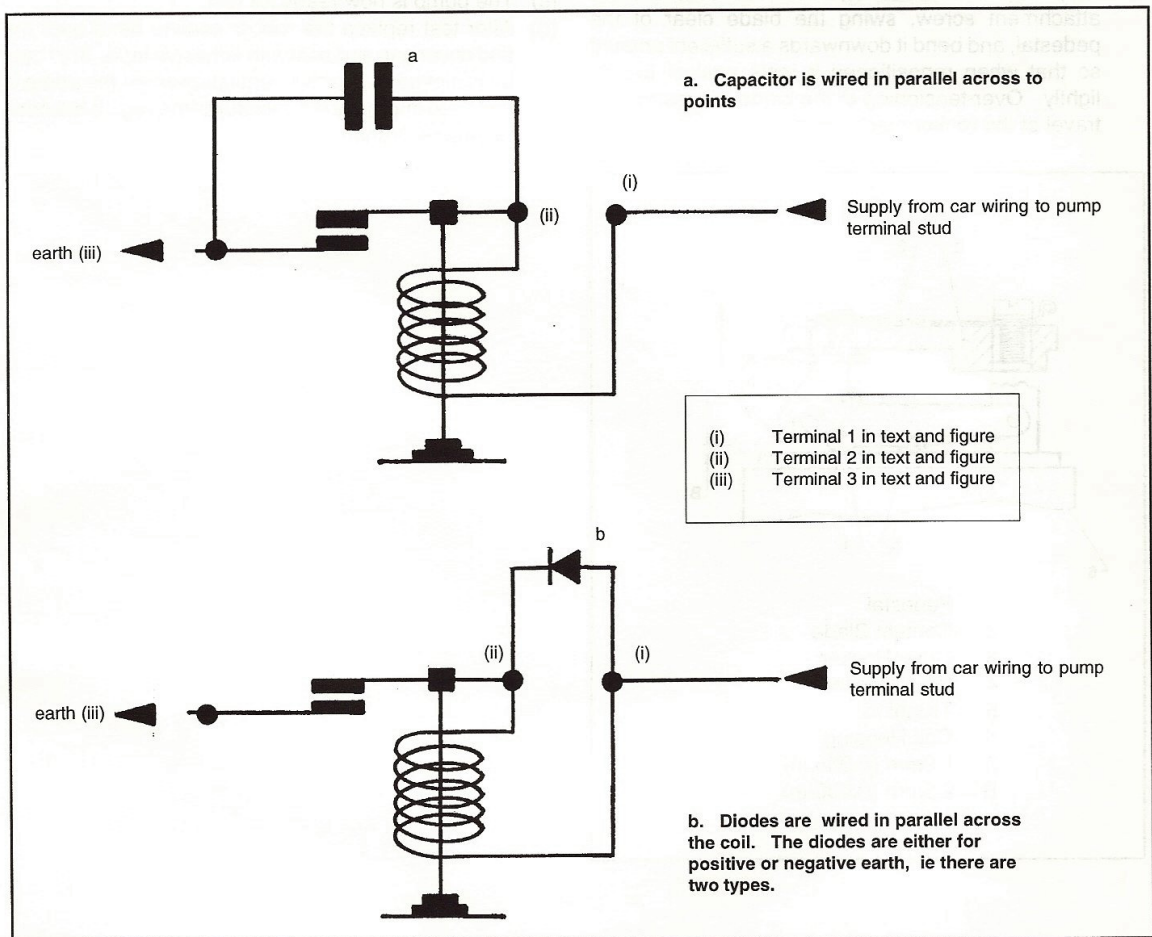


Terminals 1 and 2 are the pump-coil connections. The 2 BA tag is connected to the terminal stud and the 5 BA tag goes under the rocker blade securing screw. Terminal 3 is the earth connection from the points and goes under the pedestal securing screw to be earthed via the pump body to the car chassis.

Most pumps are now supplied with diodes as original equipment: these are polarity conscious and must be fitted correctly. Where fitted, one terminal of the diode is connected to the terminal stud and the other under the rocker blade securing screw. The diode's terminals are the means of polarity identification.

Where capacitors are fitted they are connected across the points, ie one terminal to terminal 3 and the other to the rocker blade securing screw. They are not polarity conscious.

Pump Electrical Circuits - Schematic



Electric Fuel Pump: Fault Diagnosis

Suspected Fuel Feed Failure

Disconnect the fuel line at the carburettor and check for flow. If normal, examine the carburettor for obstructed float-chamber needle seating or gummed needle.

If normal initially, but diminishing rapidly and accompanied by slow pump operation, check for correct tank venting by removing the filler cap. Inadequate venting causes a slow power stroke, with resultant excessive burning of contact points.

If a reduced flow is accompanied by slow operation of the pump, check for any restriction on the inlet side of the pump, such as a clogged filter, which should be removed and cleaned. In the case of a reduced flow with rapid operation of the pump, check for an air leak on the suction side, dirt under the valves, or fault valve sealing washers.

If there is no flow, check for:

(a) Electrical Supply

Disconnect the lead from the terminal and test for an electrical supply.

(b) Faulty Contact Points

If electrical supply is satisfactory the bakelite cover should be removed to check that the tungsten points are in contact. The lead should then be replaced on the terminal and the top contact plate connected briefly to a good earth. If the pump then performs a stroke the fault is due to dirt, corrosion or maladjustment of the tungsten points.

(c) Obstructed Pipeline Between Fuel Tank and Pump

The inlet pipe should be disconnected; if the pump then operates, the trouble is due to a restriction in the pipeline between the pump and the tank. This may be cleared by the use of compressed air after removing the fuel tank filler cap. It should be noted, however, that compressed air should not be passed through the pump, as this will cause serious damage to the valves.

(d) Faulty Diaphragm Action

If the previous operations fail to locate the trouble, stiffening of the diaphragm fabric or abnormal friction in the rocker throw-over mechanism is then to be suspected. To remedy these faults, the coil housing should be removed and the diaphragm flexed a few times. Prior to reassembly, it is advisable to apply a little thin oil to the throw-over spring spindles at a point where they pivot in the brass rockers. The diaphragm/armature assembly should then be assembled and set.

Noisy Pump

If the pump is noisy in operation, an air leak at one or other of the suction lines may be the cause. Such a leak may be checked by disconnecting the fuel pipe from the carburettor and allowing the pump to discharge into a suitable container with the end of the pipe submerged. The continuous emission of bubbles at this point will confirm the existence of an air leak. The fault should be rectified by carrying out the following procedure:

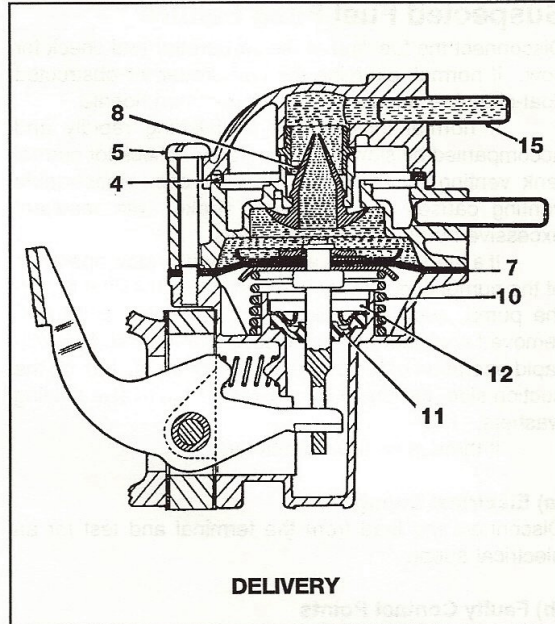
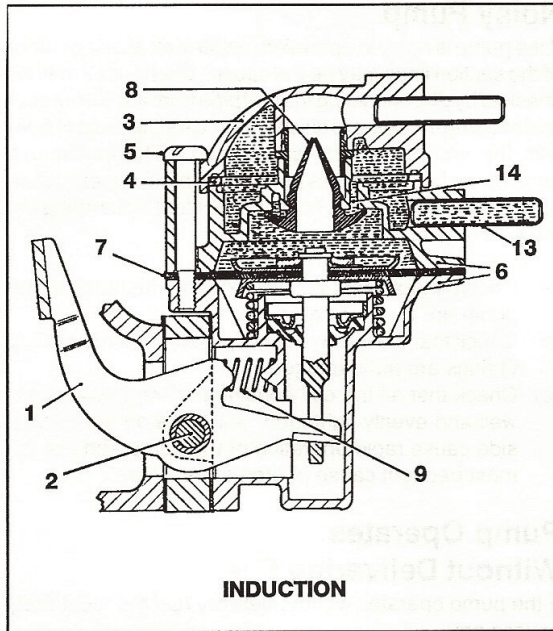
- Check that all connections from the fuel tank to the pump are in good order.
- Check that the inlet union is tight and that the sealing O rings are not damaged.
- Check that all the coil housing securing screws are well and evenly tightened. Air leaks on the suction side cause rapid operation of the pump and are the most frequent cause of premature failure.

Pump Operates Without Delivering Fuel

If the pump operates without delivery fuel the most likely causes are:

- A serious air leak on the suction side. Remedy using the instructions above.
- Foreign matter lodged under one of the valves, particularly under the inlet valve. Remove the valves for cleaning, taking care that the Melinex material of the valve is not scratched or damaged during this operation.

AUF 700 Mechanical Fuel Pump



Description

The AUF 700 pump is mounted on the crankcase on two 5/16" UNF studs with a heat insulating block and two gaskets, the total thickness of which should not be altered.

The pump lever (1) abuts against the engine cam or push-rod in the space between the camshaft and the side of the crankcase. The rocker lever pivot pin (2) is retained by the walls of the insulating block.

The outlet cover (3) and its sealing washer (4) are secured by three long No. 10 UNF screws (5).

The body (6) consists of an upper and lower die-casting, between which the diaphragm assembly (7) is clamped. Three short No. 10 UNF screws secure the two halves of the body together, the upper casting containing the inlet and outlet valve moulding (8) and the lower casting containing the rocker lever (1), pivot pin (2), rocker lever tension spring (9), diaphragm spring (10) and the crankcase seal (11) beneath a pressed steel cup (12).

The larger diameter of the combined valve moulding (8) forms the inlet valve and the two lips at the peak of the moulding form the outlet valve. The valve is a press-fit into its housing on the under-side of the upper body.

The diaphragm assembly (7) is riveted and therefore cannot be separated in service. It comprises three separate layers attached to a stirrup which is operated by the rocker lever.

Two springs are fitted, the smaller one (9) keeping the rocker lever in contact with the engine cam at all times, the larger spring (10) controlling the fuel delivery pressure.

Action

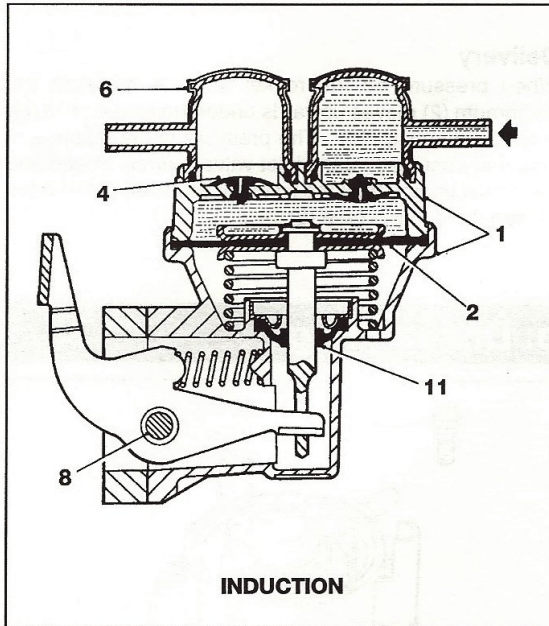
Induction

When the rocker lever is actuated by the engine cam, the diaphragm assembly moves downwards and fuel is drawn through the inlet nozzle (13) into the upper body. The fuel passes upwards through the filter (4) into the outer cover, and then flows downwards through an annular passage (14) formed outside the valve housing, past the lip of the large diameter inlet valve flap into the diaphragm chamber.

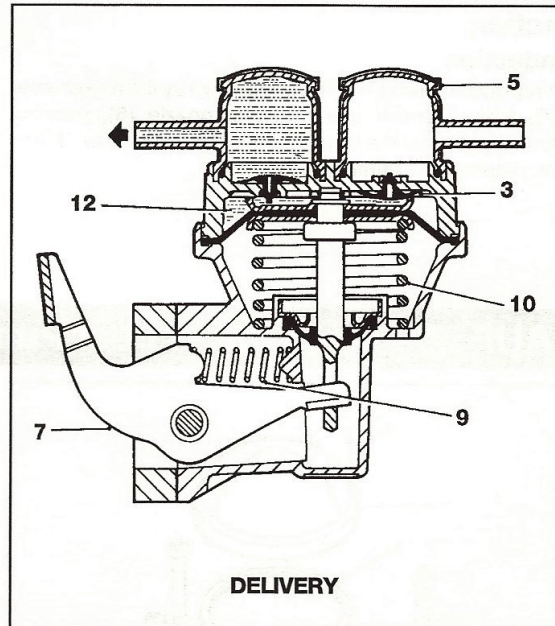
Delivery

When the engine cam lobe passes the rocker lever pad, the diaphragm (7) is allowed to move upwards under the influence of the diaphragm spring. The pressure generated in the diaphragm chamber ensures that the inlet valve flap is firmly closed and fuel is discharged through the outlet valve lips into the centre of the outlet cover and thus to the nozzle (15).

AUF 800 Mechanical Fuel Pump



INDUCTION



DELIVERY

Description

Design trends and equipment fitted to meet mandatory requirements contribute towards higher underbonnet temperatures. To meet the demand for a mechanical fuel pump capable of handling fuel at high temperatures, SU produced the versatile AUF 800 series. Of sealed unit construction, this type of mechanical pump offers excellent vapour handling capacity and 11 gal/hr pump capacity, the multi-connection inlet and outlets, with optional screwed and push-on connections, simplifying installation.

Special features:

- 1) Robust zinc die-cast sealed unit construction
- 2) Ease of installation:
 - Alternative inlet and outlet nozzle positions
 - Push-on or screwed connections
 - Alternative inlet and outlet nozzle sizes
- 3) Excellent vapour handling capacity
- 4) Efficient priming
- 5) Alternative lever or push-rod operation
- 6) Efficient crankcase seal
- 7) Competitively priced

The AUF 800 pump is mounted vertically adjacent to an eccentric drive usually on the engine crankcase or camshaft housing. Holes are provided for mounting the pump on two 8.00mm (5/16") studs. Two gaskets with an insulating block between them provide for sealing and heat protection. They also determine the correct position relative to the

pump drive and retain the rocker lever pivot pin. The pump is actuated by the rocker lever directly from the engine cam or by an intermediate push-rod.

The pump comprises two main castings; the upper and lower bodies, and two nozzles; inlet and outlet.

Two versions of the pump are available; in one the castings and nozzles are formed into a sealed unit and in the other the nozzles are detachable.

The body (1) consists of an upper and lower die casting between which the diaphragm assembly (2) is clamped. A lip on the lower body is rolled over the upper casting to form an hermetic seal.

The upper casting houses the moulded inlet (3) and outlet (4) valves and bosses are formed in it to accept the inlet (5) and outlet (6) nozzles. The lower casting contains the rocker lever (7), pivot pin (8), rocker lever tension spring (9), diaphragm spring (10) and the crankcase seal located beneath a pressed steel cup (11).

The inlet (5) and outlet (6) valves are identical mushroom-shaped elastomeric mouldings controlling ports formed in the upper body casting.

The riveted diaphragm assembly consists of a single reinforced diaphragm with two large diameter backing plates and a stirrup.

A small spring (9), acting on the rocker lever, keeps it in contact with the engine cam or pushrod at all times. The diaphragm spring (10) controls the fuel delivery pressure.

AUF 800 Mechanical Fuel Pump

Action

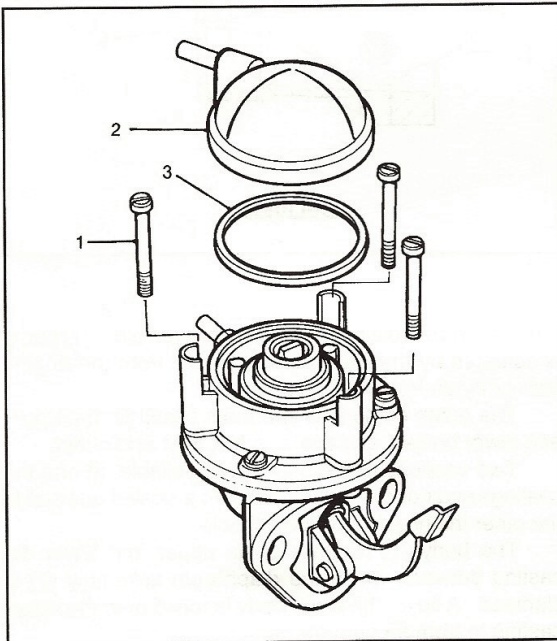
Induction

When the diaphragm (2) is pulled down by the rocker lever (7), fuel is drawn into the inlet nozzle (5), passing downwards past the lip of the moulded inlet valve (3) into the diaphragm chamber (12).

Delivery

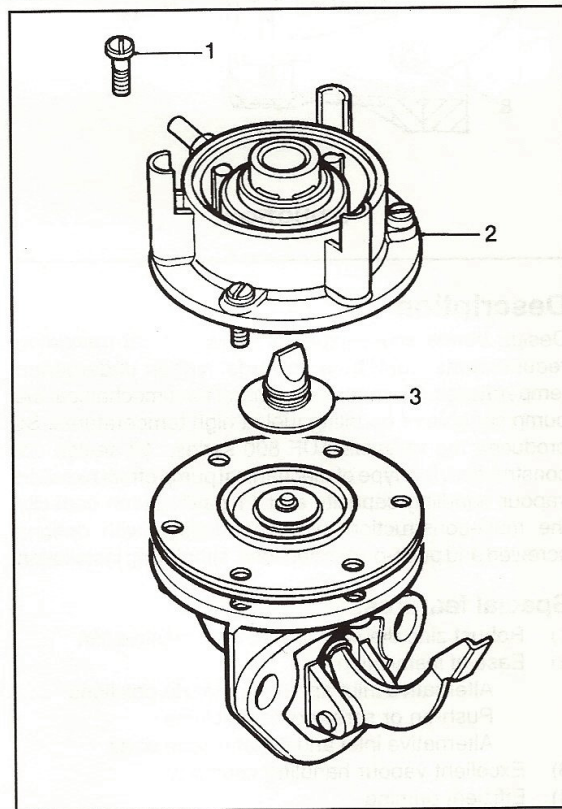
When pressure on the rocker lever is released the diaphragm (2) moves upwards under the influence of the diaphragm spring (10). The pressure in the diaphragm chamber ensures that the inlet valve is firmly closed and fuel is discharged past the lip of the moulded outlet valve (4) into the outlet nozzle (6).

AUF 700 Mechanical Fuel Pump: Dismantling



1

- Thoroughly clean the outside of the pump.
- Mark parts clearly to facilitate reassembly.
- Unscrew the three long screws (1), No. 10 UNF, retaining the outlet cover (2).
- Remove the outlet cover, sealing ring (3), and filter if fitted.

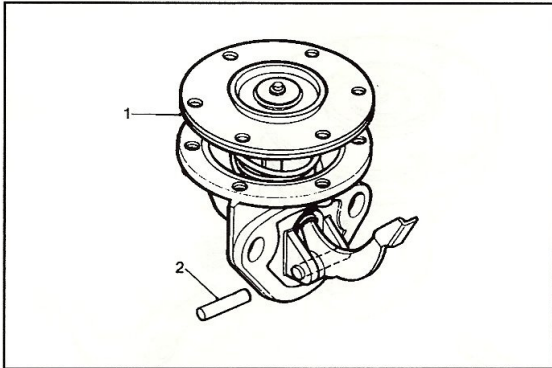


2

- Unscrew the three short No. 10 UNF body securing screws (1).
- Remove the upper body (2).
- Remove the combined inlet and outlet valve moulding (3).

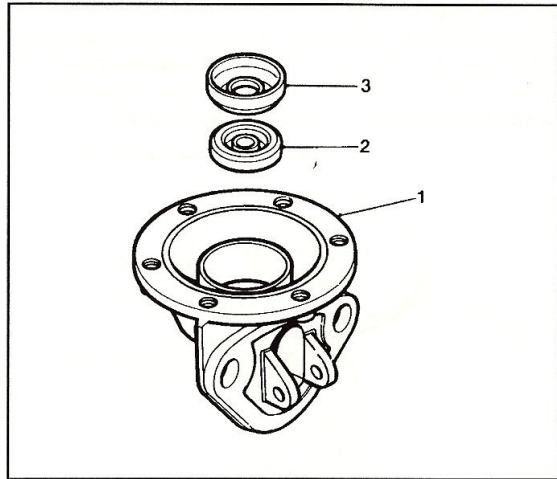
Note: The valve is a press-fit in its housing. Sharp tools must not be used and care must be taken not to damage the fine edge of the larger diameter forming the inlet valve.

AUF 700 Mechanical Fuel Pump: Dismantling



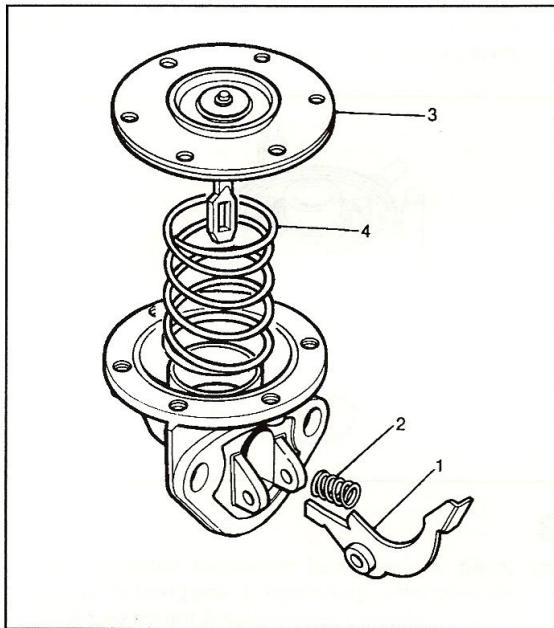
3

- (a) Release the diaphragm assembly (1) by tapping out the rocker lever pivot pin (2) from either direction using a soft metal punch.
- (b) At the same time, hold the diaphragm and rocker lever against spring pressure.



5

- (a) The crankcase seal (2) is held in position by a pressed steel cup (3) and should only be removed if a replacement cup is available.
- (b) When removing the steel cup, care must be taken not to damage the pump lower body (1).

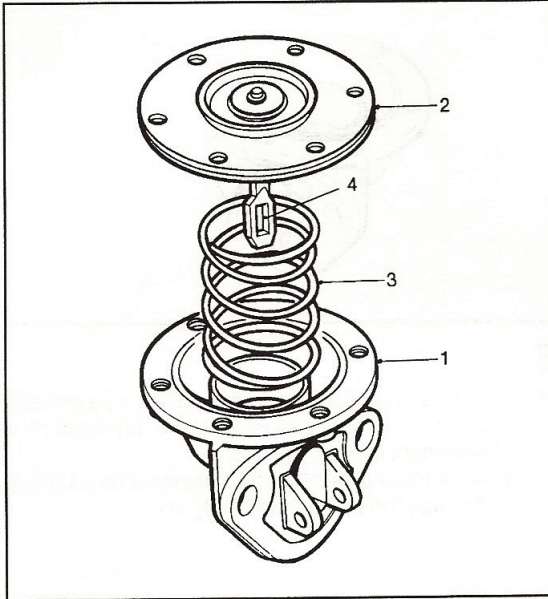


4

- (a) Withdraw the rocker lever (1) and spring (2).
- (b) Withdraw the diaphragm (3) and spring (4).

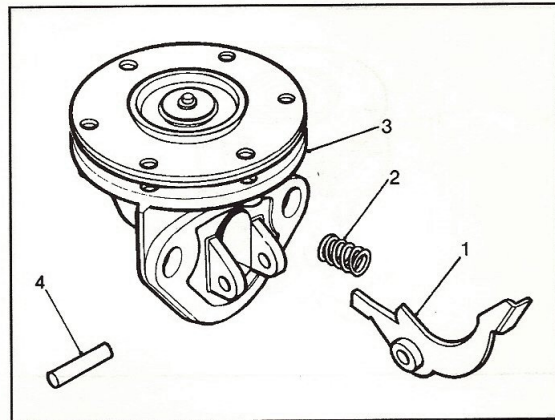
AUF 700 Mechanical Fuel Pump: Reassembly

Before reassembly, all components must be examined for damage and wear. Particular attention must be paid to the outlet valve lips, the fine edge of the large diameter inlet valve, and the plastic insert in the outlet cover. Unserviceable components must be renewed.



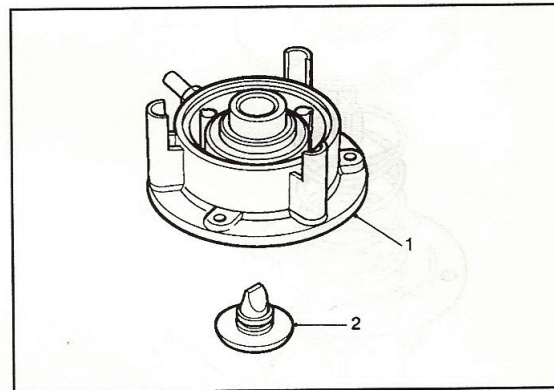
1

- Place the diaphragm spring (3) in the lower body (1).
- Remove any sharp edges from the diaphragm spindle and stirrup. Lightly smear with clean engine oil.
- Position the diaphragm assembly (2) over its spring, pushing the stirrup through the crankcase oil seal, so that the stirrup slot (4) is lined up to receive the rocker lever.



2

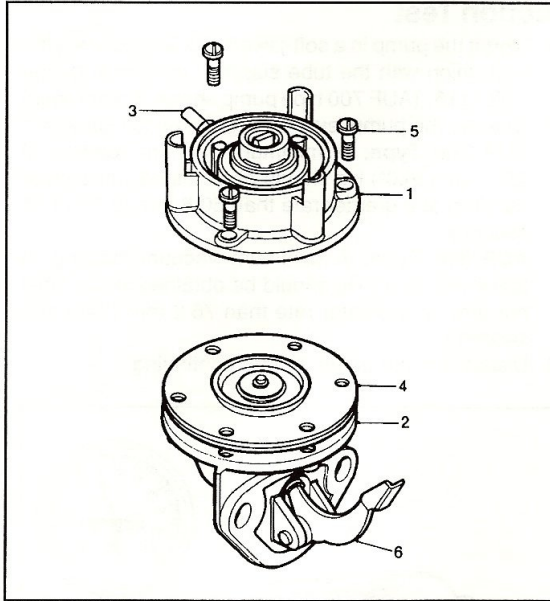
- Fit the rocker lever (1) and tension spring (2) into the lower body (3) with the rocker lever tip engaged in the diaphragm stirrup slot, and the tension spring located both on the conical boss in the casting and the protrusion on the rocker lever.
- Holding the rocker lever against its tension spring pressure, line up the pivot pin holes and gently tap the pivot pin (4) into position.



3

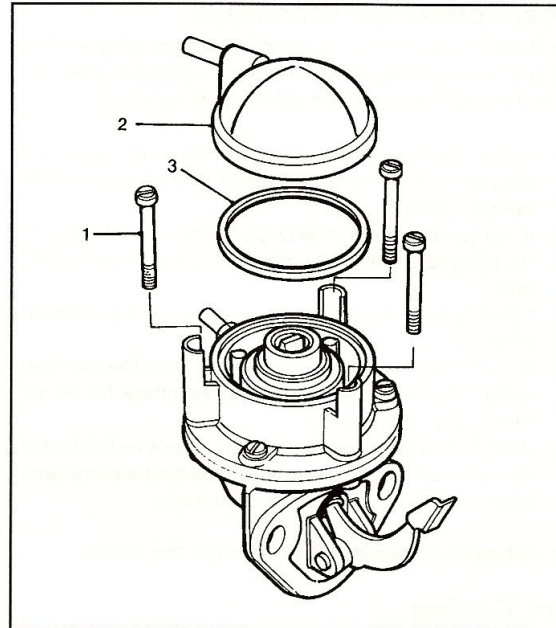
- Insert the combined inlet/outlet valve (2) into its housing in the upper body (1) and press into position.
- Ensure that the groove around the valve moulding registers with the ridge in the valve housing, and that the fine edge of the large diameter inlet valve lies evenly on its seating without puckering.

AUF 700 Mechanical Fuel Pump: Reassembly



4

- Depress the rocker lever (6) so that the diaphragm (4) lies flat and position it so that the screw holes in diaphragm and lower body (2) are lined up.
- Attach the upper body (1) to the lower body with the short screws (5), ensuring that the inlet pipe (3) is in the correct position. Leave the screws slack at this stage.



5

- Replace the filter, if fitted, cover sealing ring (3) and outlet cover (2).
- Insert the three long screws (1) ensuring that they pass freely through the diaphragm holes.
- Tighten the three short screws evenly.
- Position the outlet nozzle and tighten the three long screws evenly.

Mechanical Fuel Pump: Fault Diagnosis

Suspected Fuel Starvation

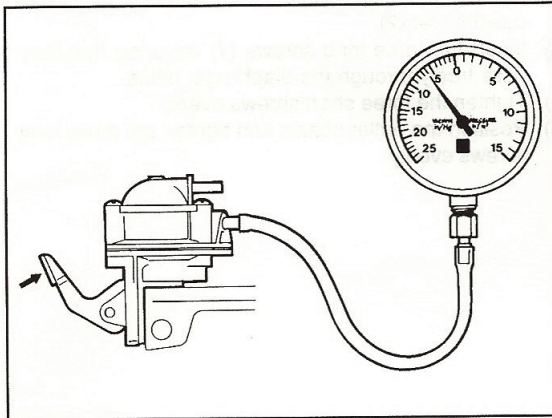
To check the fuel flow, disconnect the carburettor end of the fuel line and place the line into a suitable container. With the **ignition switched off** rotate the engine.

- If the flow is normal, examine the carburettor for obstructed float chamber needle seating or gummed needle valve.
- If the flow is normal initially, but falls off rapidly, check for adequate fuel tank venting by removing the filler cap.
- Other causes of a low fuel flow are a choked pump or tank filter.
- If quantities of air bubbles emerge from the fuel line whilst it is immersed in a container, check for an air leak in the inlet fuel line.
- AUF 700 Type:** If there is no flow, check as in (d) and if no air bubbles are present, dismantle the pump and examine the valves and the diaphragm.

Do not pass compressed air through the pump.

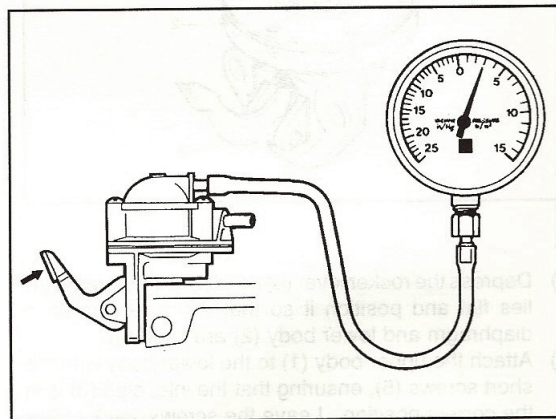
Dry Testing

The following sequence of tests are recommended when the fuel pump performance is suspect or after dismantling and reassembly.



Suction Test

- Mount the pump in a soft-jawed vice and connect the inlet union with the tube supplied to special gauge 18G 1116. (AUF 700 type pump shown in diagrams.)
- Operate the pump lever through three full strokes.
AUF 700 Type: A minimum vacuum reading of 152.4 mm (6.0") Hg should be obtained which must not drop at a greater rate than 50.8 mm (2.0") in 15 seconds.
AUF 800 Type: A minimum vacuum reading of 228.6 mm (9.0") Hg should be obtained which must not drop at a greater rate than 76.2 mm (3.0") in 5 seconds.
- Disconnect the gauge before continuing.



Delivery Test

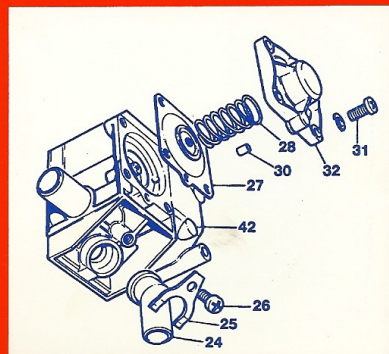
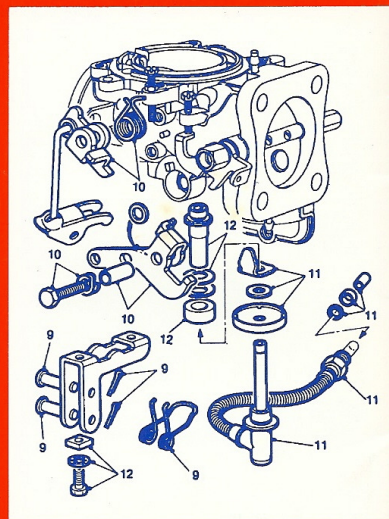
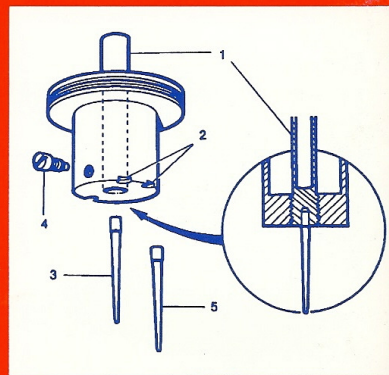
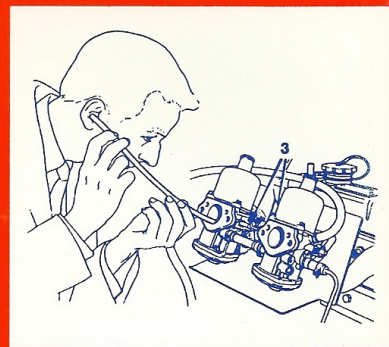
- With the pump still mounted in the vice, connect the outlet union to the gauge 18G 1116 using the same tube.
- Operate the pump lever through two full strokes.
AUF 700 Type: A minimum reading of 0.21 kg/cm² (3.0 lb/in²) should be obtained which should not fall by more than 0.0035 kg/cm² (0.5 lb/in²) in 15 seconds.
AUF 800 Type: A minimum reading of 0.42 kg/cm² (6 lb/in²) should be obtained which should not fall by more than 0.140 kg/cm² (2 lb/in²) in 5 seconds.

The list of classic car manufacturers who have chosen SU carburetters seems endless. Yet when George and Carl Skinner produced their first model in 1905, many predicted it would give trouble because it incorporated a bellows made of leather.

Ninety years later, SU carburetters still give excellent results today with the minimum of attention. The leather bellows disappeared long ago and the carburetter has undergone near continuous development and refinement, but every SU has followed the original principle.

This SU Workshop Manual contains clear, detailed, easy-to-follow instructions for servicing and tuning the most common types of SU carburetter, H,HD,HS and HIF, as well as thermo carbs, electric and mechanical fuel pumps and AED's. Starting with basic principles, the manual takes you through routine servicing, dismantling, inspection, re-assembly and tuning for each of the carb types, and a fault diagnosis chart helps track down running problems. The manual also contains detailed information on such topics as emission control.

The SU Workshop Manual is your authoritative guide to maintaining any SU carb, pump or AED.



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