DESCRIPTION

The HS carburetter is of the automatically expanding choke type in which the size of the main air passage (or choke) over the jet, and the effective area of the jet, are variable, according to the degree of throttle opening used on the engine against the prevailing road load (which may differ widely from light cruising to heavy pulling).

This automatic regulation of the size of the choke over the complete throttle range gives an approximately constant air velocity over the jet (sometimes called a constant vacuum carburetter) which is sufficient to ensure good atomization at all speeds, making multiple jets unnecessary.

Therefore to serve the complete throttle range a single jet only is used, being a simple metal tube sliding in a single bearing bush, fed by fuel along a small-diameter nylon tube leading direct from the base of the float-chamber, which is varied in effective area by a tapered fuel metering needle sliding into it, the exact profile of the 'taper' being altered to suit differing engines, running conditions, or climates. As the exact profile of this needle (identified by a type marking on the shank end) is only settled after long and expert tuning, it is generally inadvisable to change to an alternative type from the 'standard' tuning.

ADJUSTMENTS

(1) Needle changing (for mixture ratio alteration)

If the general mixture strength is suspect, or simply being checked over, first remove the suction chamber and piston unit, and after slackening off the needle clamping screw extract the needle and check its identifying marking against the manufacturer's recommendation. When this has been satisfactorily settled replace the needle (or its correct substitute) and lock it in the standard position, having the shoulder on the shank just flush with the end face of the piston.

If the mixture ratio for the general throttle range or a particular portion of it (*excluding* idling) appears unsatisfactory and other factors, such as defective ignition, sparking plugs, air leaks, or poor compressions, etc., have been checked then in rare cases a change of needle type may be beneficial. In case of any real difficulty, write to us giving details of the performance.

The fitting of a fresh type of needle may, in the odd case, call for the re-centring of the jet assembly, and this matter should be checked according to Section (3).

(2) Tuning

Presuming that the needle is of the correct type, tuning is confined to correct idling adjustment, and this is carried out by movement of the idling stop screw (5, Fig. 2) and the jet adjusting nut (2, Fig. 1), but before making these adjustments it is essential that the engine should have attained its normal running temperature.

The stop screw (5, Fig. 2) should be set to give a reasonably brisk idling speed (which can be reduced later, if necessary, after the jet position has been settled), and then the jet position should be so adjusted, vertically by nut (2, Fig. 1) that for this given position of screw (5, Fig. 2) the **fastest idling speed is obtained consistent with even firing.**

If the firing is uneven, with a 'splashy', irregular type of misfire and a colourless exhaust, then the mixture is too weak and the jet nut should be suitably lowered; whilst if the firing is uneven, with a 'rhythmical' or regular misfire and a blackish exhaust, then the mixture is too rich and the jet nut should be raised.

If the return spring on the jet lever is temporarily removed in order to give easier access to jet nut (2, Fig. 1) make sure that the jet head is abutting hard up against the under side of this nut after every adjustment; really good slow running is critical to a sixth of a turn of this nut, or one 'flat' of the hexagon, on some engines.

When the slow-run mixture is correct lifting the piston by means of the small spring-loaded pin on the side of the body casting will slightly increase the speed of idle to start with, but when the full travel of the pin is reached, giving about $\frac{1}{4}$ in. of piston lift, the resulting weakening effect should stall the engine.

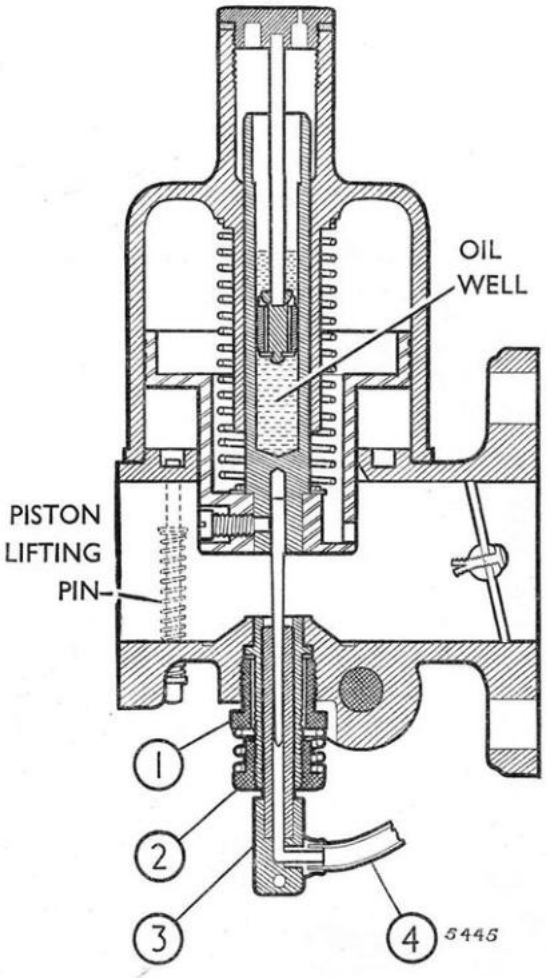


Fig. 1

Check that when the jet is abutting hard up against its adjusting nut the choke cable is *not taut* but slightly slack—if it is not, the cable will need repositioning under the clamp screw in the end of the jet lever.

(3) Jet centring

When the suction piston is lifted by hand (engine not running) it should fall freely and hit the inside 'jet bridge' with a soft metallic click—that is, with the jet adjusting nut (2, Fig. 1) in its topmost position. (There is a small spring-loaded pin under the suction chamber mounting flange which, when pressed upwards, lifts the piston.)

If this click is not audible, but is so when the test is repeated with the jet in the fully lowered position, then the jet unit requires recentring on the needle, as described below.

It may be helpful to understand that the complete jet unit, clamped in position by lock screw (1, Fig. 1), is held in a clearance bore that permits a limited amount of radial float prior to being locked. Therefore if this lock screw is slackened away half a turn, and then the needle and piston lowered fully, the jet unit will concentrically locate itself around the needle and can then be locked in that position.

The procedure for recentring should be as follows:

(*a*) Disconnect the rod between the jet lever and jet head (7, Fig. 2).

(*b*) Unscrew the union holding the nylon feed tube into the base of the float-chamber, and withdraw the tube and the jet together. Unscrew the jet adjusting nut, and remove the lock spring.

Replace the adjusting nut, and screw it right up to its topmost position, then replace the jet and feed tube.

(*c*) Slacken off the large jet locking screw (1, Fig. 1) until the jet bearing is just free to rotate by finger pressure.

(*d*) With the damper or oil cap removed and using a pencil on top of the piston rod, gently press the piston and needle down onto the jet bridge.

(*e*) Tighten the jet locking screw, observing that the jet head is still in its correct angular position.

(*f*) Lift the piston and check that it falls freely and evenly, hitting the jet bridge with a soft metallic click. Then fully lower the jet and re-check to see if there is any difference in the sound of the impact; if there is and the second test produces a sharper impact sound, the centring operation will have to be repeated until successful.

(*g*) In the occasional obstinate case the jet adjusting nut (as well as its lock spring) should be temporarily removed to enable the jet to reach a higher position and make the centring effect more positive, the nut and lock spring being replaced after the successful conclusion of the operation. Do not forget to refill the damper reservoir in the piston rod (see Section 4) as may be necessary.

(4) Refilling oil damper reservoir in piston rod

This needs topping up periodically, about every three months, with thin engine oil to grade S.A.E.20,

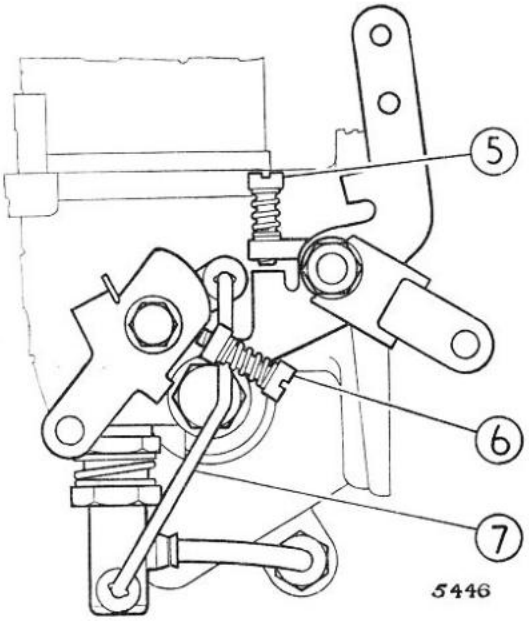


Fig. 2

and this operation is not at all critical; simply unscrew and remove the damper unit and then pour oil into the hollow piston rod to within about $\frac{1}{2}$ in. from the top of the rod, and then rescrew the plunger unit into position. Incidentally, the function of this piston damper unit is to provide an appropriate degree of enrichment for acceleration, and it also improves cold starting and drivability from cold.

(5) Cleaning suction chamber and piston

This should be done at approximate intervals of every 12 months. After detaching the unit, clean the main inside bore of the suction chamber and the two outside diameters of the piston with a rag moistened in petrol, and then reassemble in a dry and clean condition with a few spots of thin oil on the piston rod *only*. Don't forget to refill the damper reservoir after this operation if that component is used.

(6) Float-chamber fuel level

It will be noticed that the float lid is fixed by three small screws on the outer diameter and that the float is of simpler construction, having no central tube. The needle and seating are the same as fitted in other types of S.U. carburetter, also the fuel level is raised or lowered by bending the float hinged lever either upwards or downwards respectively to the dimension given below.

The fuel level is not critical, and need not be treated with meticulous accuracy—the normal level is $\frac{3}{8}$ in. under the rectangular inner facing known as the jet bridge, but this is rather difficult to observe even with the suction chamber and piston removed and the jet fully dropped.

However, a simple mechanical check can be made, and this consists of sliding a certain diameter of check rod between the lid face and the inside curve of the forked end of the hinged lever when the needle valve is in the 'shut-off' position. The size of this rod is $\frac{5}{16}$ in.

If the hinged lever fails to conform within $\frac{1}{32}$ in. of this check figure it must be carefully bent at the start of the flanged section, in the necessary direction for correction.

It must be emphasized that it is not advisable to alter the fuel level unless there is trouble with flooding; and although too high a level can cause slow flooding, particularly when a car is left ticking over on a steep drive, it should be remembered that flooding can also be caused by grit in the fuel jamming open the needle valve, or excessive engine vibration, or a porous float.

(7) Adjustment of jet and throttle interconnection

With the cam-type jet and throttle interconnection, the outer adjusting screw (6, Fig 2) should be about $\frac{1}{64}$ in. (thickness of visiting-card) away from the cam face when the engine is warm and idling on a closed throttle. If the jet adjusting nut is altered in position substantially, then screw (6, Fig. 2) may also need a suitable readjustment.

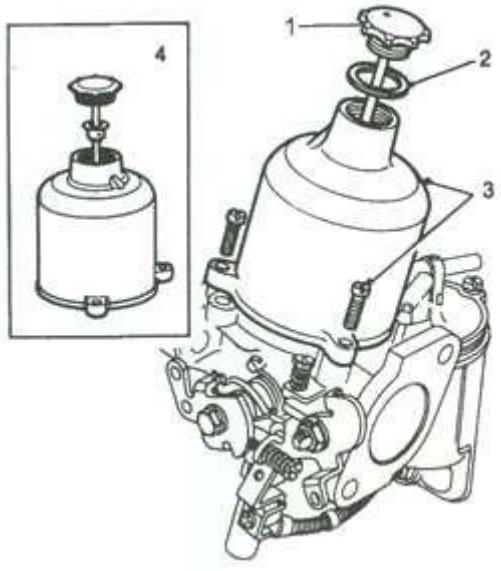
(8) Effect of altitude and climatic extremes on standard tuning

The standard tuning employs a jet needle broadly suitable for temperate climates from sea-level up to 6,000 ft. Above that altitude it may be necessary, depending on extremes of climatic heat and humidity, to use a weaker tuning.

The factors of altitude, extreme climatic heat, and humidity each tend to demand a weaker tuning, and a combination of any of these factors would naturally emphasize this demand. This is a situation which cannot be met by a hard-and-fast factory recommendation owing to the wide variations in the conditions existing, and in such cases the owner will have to do a little experimenting with alternative weaker needles until one which is satisfactory is found.

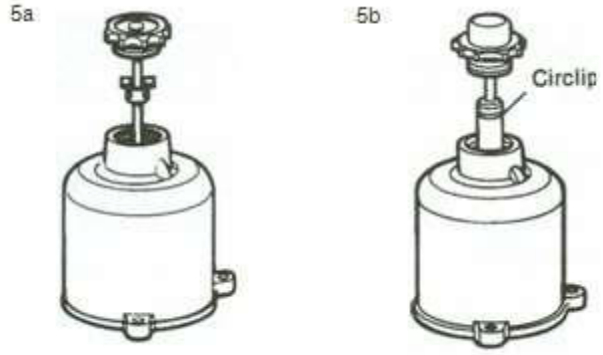
The necessary weakening may be affected by changing to a weaker type of piston spring or even discarding the spring itself and running without one.

HS2, HS4 and HS6 Carburetter: Dismantling



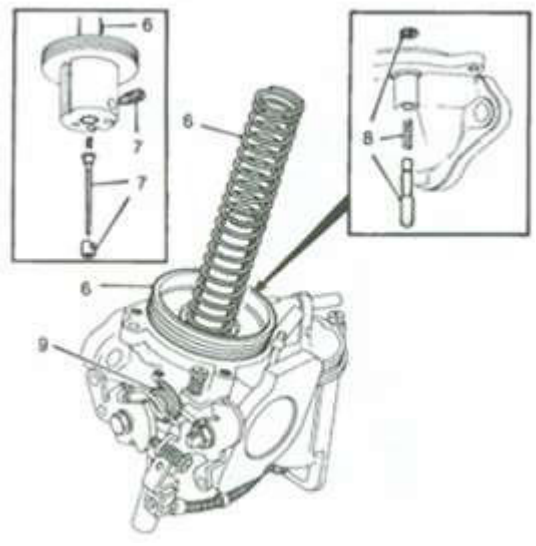
1

(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.



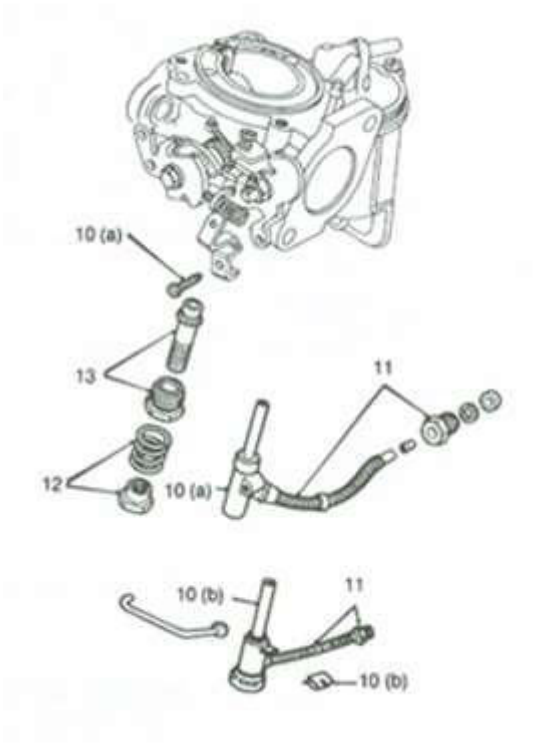
2

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).



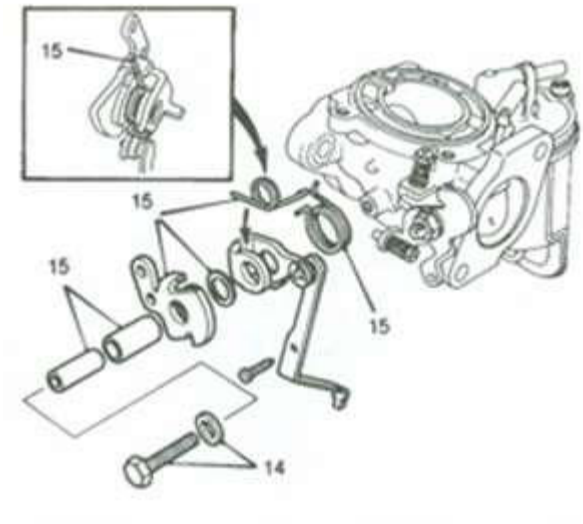
3

(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 H Type Carbs: Routine Servicing for needle fitment and jet centring.
(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).



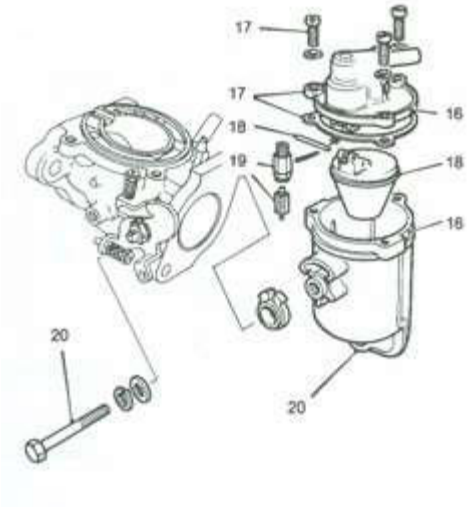
4

(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 jettube sleeve nutfrom 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).



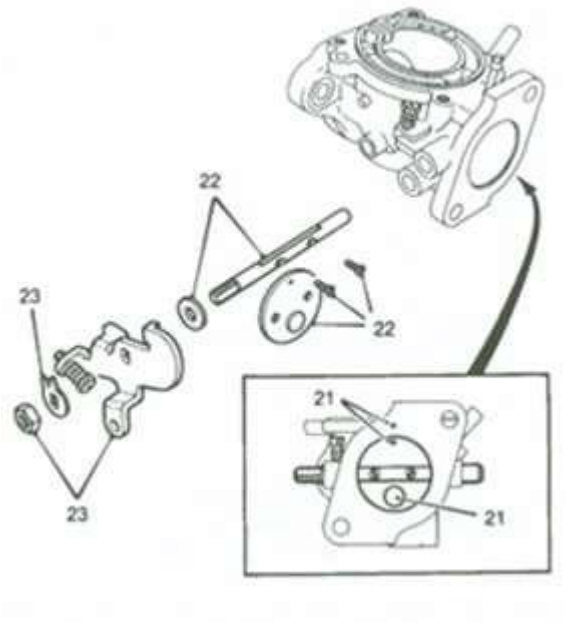
5

(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).



6

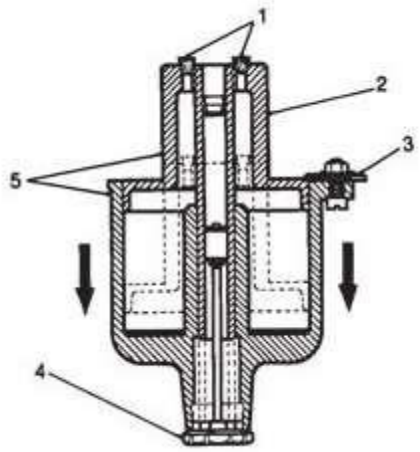
(a) Mark the float-chamber lid location to facilitate accurate reassembly (16).
(b) Remove the lid securing screws and detach the lid with its joint washer and float (17).
(c) Hold the float hinge pin at its serrated end and withdraw the pin and float (18).
(d) Extract the float needle from its seating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



7

(a) 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).
(b) 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).
(c) 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).

HS 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 and seating for any damage and excessive wear; renew if necessary.
(c) Check condition of all 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

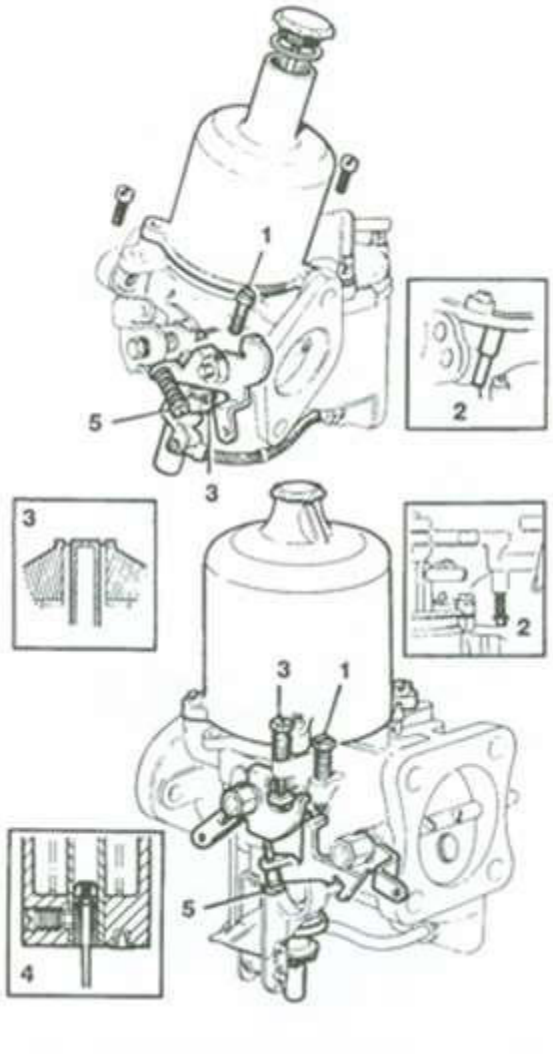
Ball bearing suction chambers. Check that all the balls are in the piston ball race (2 rows, 6 per row). Fit the piston into the suction chamber, without the damper and spring, hold the assembly in a horizontal position and spin the piston. The piston should spin freely in the suction chamber without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

HS Type Carburetter: 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 carburetter in an endeavour to rectify poor engine performance, make sure that the maladjustment or fault is not from another source by checking the following:

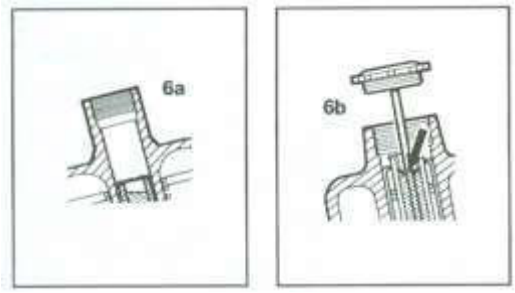
Valve clearance
Spark plug condition
Contact breaker (dwell angle)
Ignition timing and advance
Presence of air leaks into the induction system
1

(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 (multi carburetters) (1).
(d) Raise the piston of each carburetter 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 carburetter 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 carburetter, 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 multi carburetters).
(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.



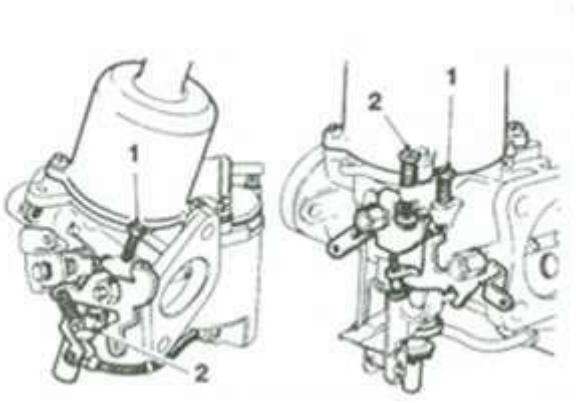
4

Check the piston damper oil level:

(a) Standard suction chambers. Unscrew the cap and withdraw the damper. Top up with 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 raise the piston and damper to the top of their travel. Fill the recess in the damper retainer with 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 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

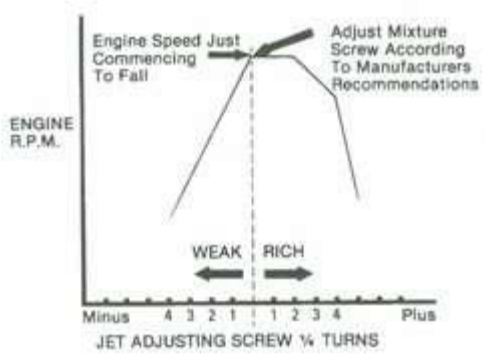
(a) Vehicles with emission control. Connect a reliable tachometer to the engine in accordance with the instrument manufacturer's instructions.
(b) Start the engine and run it at a fast-idle speed until it attains normal running temperature, then run it for a further five minutes.
(c) Increase the engine 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.

HS Type Carburetter: Tuning Single Carbs



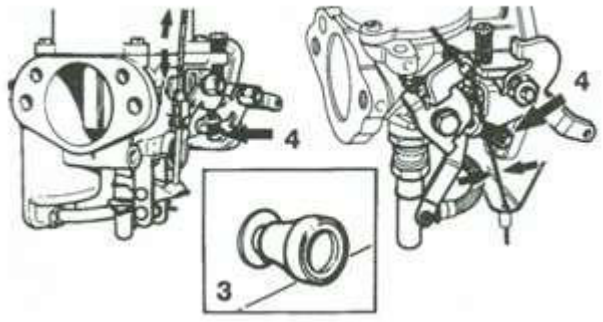
1

(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 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.
(c) Check the idle speed, and readjust it as necessary with the throttle adjusting screw to obtain the correct setting.



2

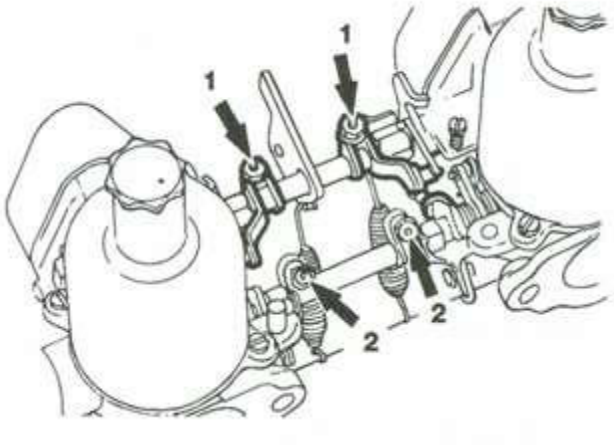
Vehicles with emission control. Using the exhaust gas analyser, check that the percentage CO reading is within the limits given by the vehicle manufacturer. If the reading falls outside the limits given, reset the jet adjusting nut/ screw by the minimum amount necessary to bring the reading just within 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

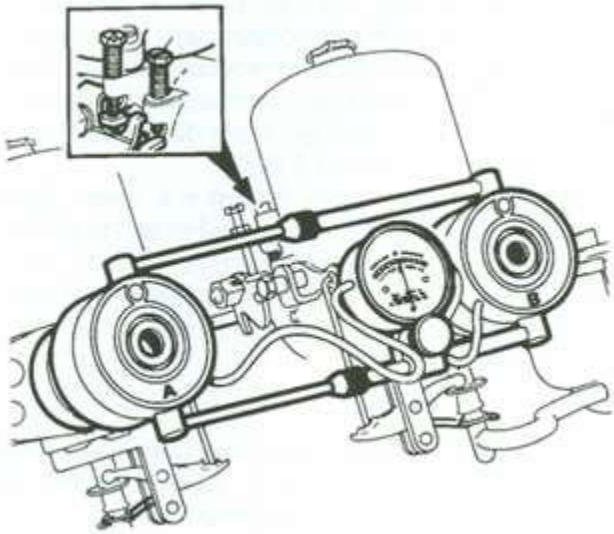
(a) With the fast-idle cam against its return stop, check that a 1.6 mm (1/16 in) free movement of the mixture control (choke) cable exists before the cable moves the cam.
(b) Pull out the mixture control (choke) (3) until the linkage is about to move the jet.
(c) Turn the fast-idle adjusting screw (4)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

HS Type Carburetter: Tuning Multi-Carbs



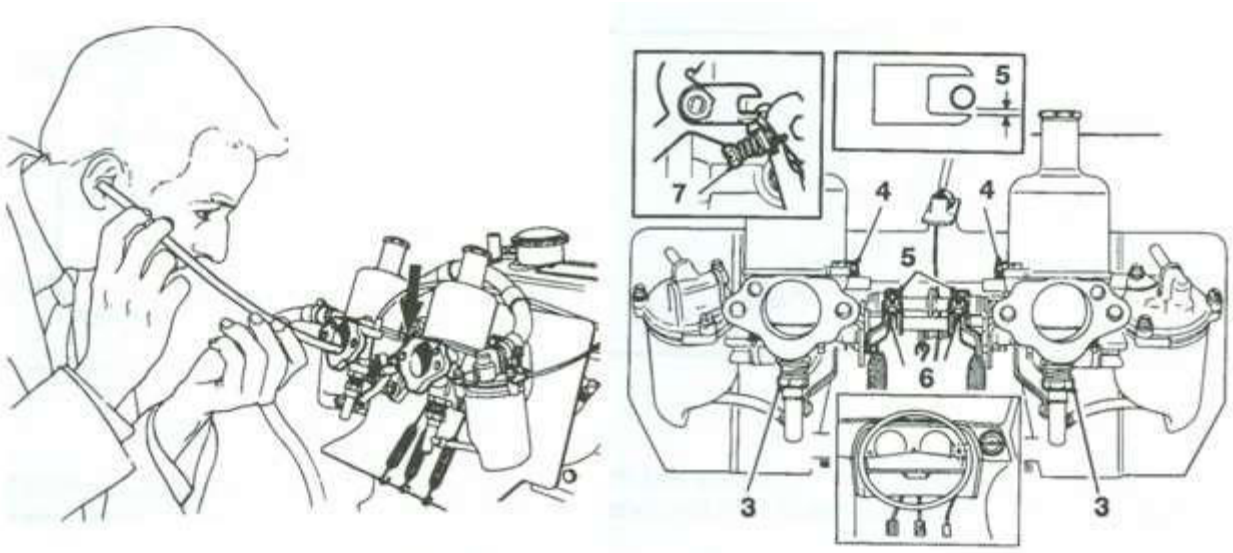
1

(a) Slacken both clamping bolts (1) on the throttle spindle interconnections.
(b) 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 and turn the throttle adjusting screws until the hiss is the same.



Using a 'listening tube' to balance multi-carburetters

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.

TR4A Carburetors - SU HS6