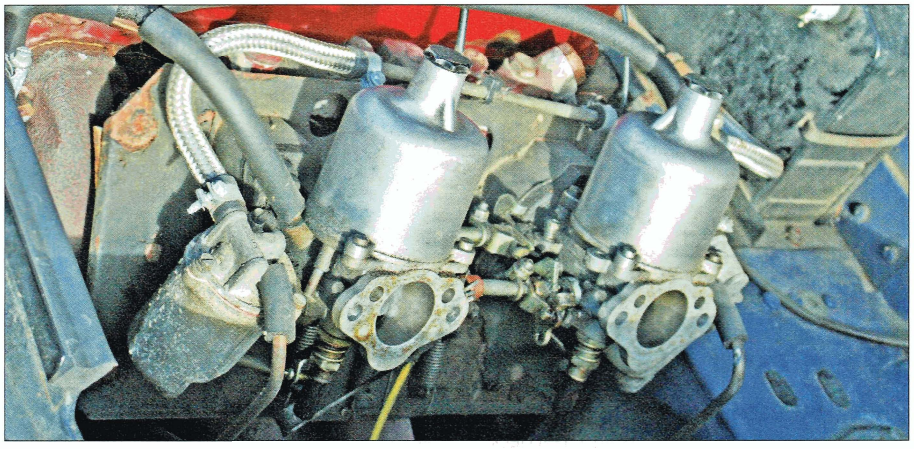
SU CARBURETTORS

PART 2



Twin HS4s air filters removed

SU Adjustment

Twin SUs are straightforward to set up, with four main areas of adjustment for the older pre HIF series carburettors, but the later HIFs have fixed jet positions so item one doesn't apply.

1. Jet alignment
2. Synchronising the air intakes
3. Adjusting the mixture
4. Setting the idle speed

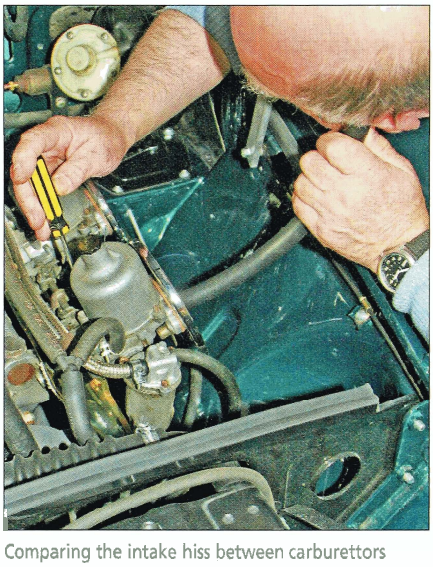
1. Jet alignment HS4s

Jets are usually set up and centered correctly, the best way to check is to raise the piston and let it fall back, if it descends slowly but still makes an audible clunk when it reaches the end of its travel then the jet is centred. However if it sticks or is extremely slow to fall then first satisfy yourself that the needle is not bent and after that you can consider checking the jet alignment. On an HS4 you can slacken the large nut immediately beneath the jet and then turn it until the needle damper assembly falls smoothly into place with the desired audible click, then tighten up the locking nut.

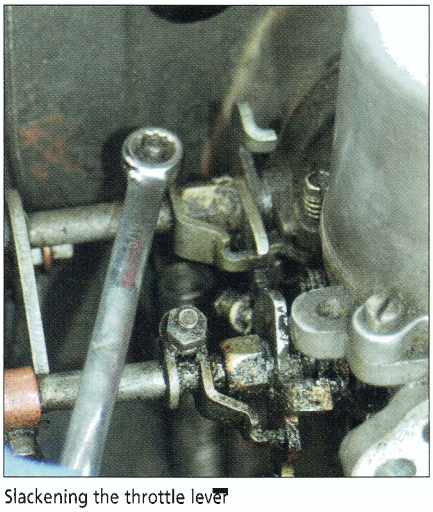
2. Synchronising the air intake

The butterfly valves inside each carburettor control the air intake; these are linked by a centre spindle which has clamps that can be adjusted. Ideally both carburettors should draw in air at the same rate. To achieve this first remove the air cleaners then slacken off the centre spindle clamps, start the engine and then using a balance gauge or follow the most traditional SU tuners who use a piece of rubber tube held against the same position in the mouth of each carburettor to compare the air intake by listening to the hiss of the air being draw into each carburettor. Adjustment is made by the throttle screw on an HS4 SU, which has separate float chambers or by a screw in the body of an HIF unit with integral float chambers.

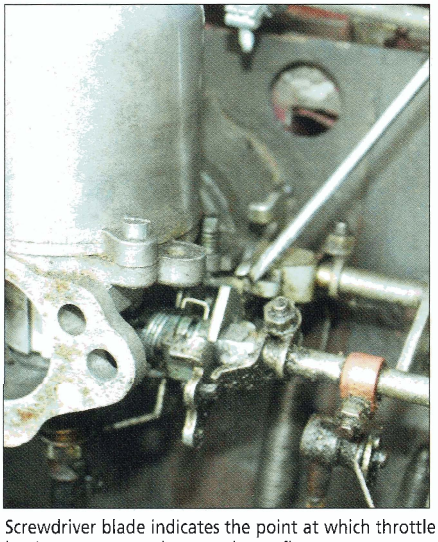
Once satisfied that the hiss sounds the same on both units, tighten the clamps and then check the intake hiss again.



Comparing the intake hiss between carburettors



Slackening the throttle lever

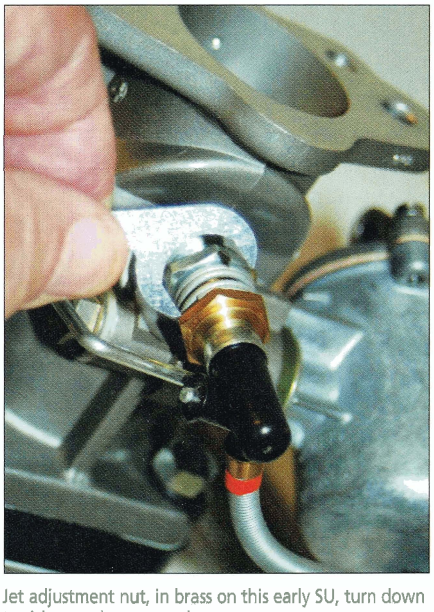


Screwdriver blade indicates the point at which throttle begins to act on carburettor butterfly

3. Adjusting the mixture

The following advice takes the traditional approach as mentioned in workshop manuals for decades, but there is also an alternative route that can make tuning simpler, faster and just as accurate, perhaps more so for those who do not have the 'SU touch'.

The mixture setting of early H and HS carburettors is adjusted by the centre nut at the bottom of each SU which lowers or raises the base of the jet, when the manual choke is pulled out the jet is lowered by a lever to allow more fuel into the carburettor.



Jet adjustment nut, in brass on this early SU, turn down to richen and up to weaken

The HIF carburettors are adjusted by way of a small mixture adjustment screw

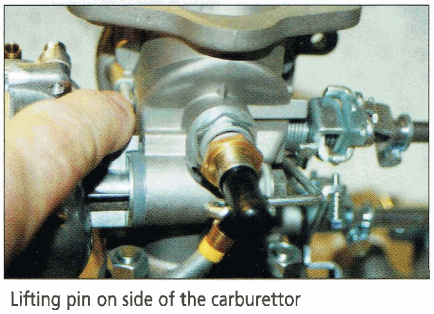
that is found in an angled cast tube to the side of each carburettor and this is internally attached to the base of the main jet to raise or lower the jet. Lowering a jet richens the mixture whilst raising the jet weakens it.

With the carburettors synchronised and the slow running set, you can now adjust the mixture. If your spark plug electrodes were all of an even biscuit colour then there may be no need to adjust them. But if blackened by too rich a mixture then wind the mixture adjusting nut up to weaken or down to richen the mixture, or on the later HIF units turn the adjusting screw clockwise to enrich the mixture and anti-clockwise to weaken the mixture. Make very small adjustments and allow time for the change to take effect, say no more than two or three flats for the H and HS carburettors and be especially gentle with the HIF mixture screw as this is oversensitive, so no more than an 1/8th of a turn at a time.

A useful tool to assist in this process is a Gunson's Colourtune, which is a see through spark plug which reveals the colour of the combustion taking place in the cylinder. To be able to see the colour clearly it's a good plan to have the car in a shady spot, the Colourtune comes with a special plastic tube and mirror attachment to assist viewing but the colour is difficult to determine in bright sunlight. With the engine running the optimum setting is at the moment when the red or orange of too rich a mixture just turns into a Bunsen blue.

Colourtune showing red for too rich a mixture

Alternatively or in addition you can use the lifting pins at the side of each instrument. Once the carburettors have been synchronised, the lifting pins can be used to check the mixture adjustment. Raise the lifting pin on the front carburettor



Lifting pin on side of the carburettor

to lift the piston by 1/32 in or 8mm.

1. If the engine speed increases the mixture strength of the front carburettor is too rich.

2. If the speed immediately decreases then the mixture strength of the front carburettor is too weak.

3. If the engine speed momentarily increases very slightly, then the mixture strength of the front carburettor is just right, but do not be surprised to find that on some engines this doesn't occur, which is one area where this method can cause confusion and owners adjust further than needed as they try to find that elusive slight rpm increase then settling back. In these cases settle for a slight rpm rise when the mixture has been adjusted from the last test which was weak and expect to need further small adjustments following a test drive.

Repeat this operation for the rear carburettor and after adjustment re-check the front carburettor, since both are dependent on each other.

When the mixture is correct the exhaust note will be regular and even, if it is an irregular or rhythmical splashy type of misfire in the exhaust beat, then the mixture is too rich. Also, after a run check that the plugs have a biscuit colour rather than have a black and sooty or white and ashen appearance.

Alternative mixture set up

The following simple process is not in any manual, but the logic is so obvious it is amazing it never became standard procedure.

We have covered the need to synchronise the air flow into the carburettors so each unit is drawing the same air volume, so why do we not do a similar synchronising process on the mixture side? Well we can and it is often most effective and simplifies the overall process.

To start with, remove each carburettor dashpot and piston and lay carefully to one side. Often it is useful to be able to sit the pistons upright poking the needles through a hole or in the gap between the jaws of a Workmate or similar. This means security and also no mess of oil having drained out of the dashpot tubes.

This can also be a good time to confirm that the needles are correctly fitted in the

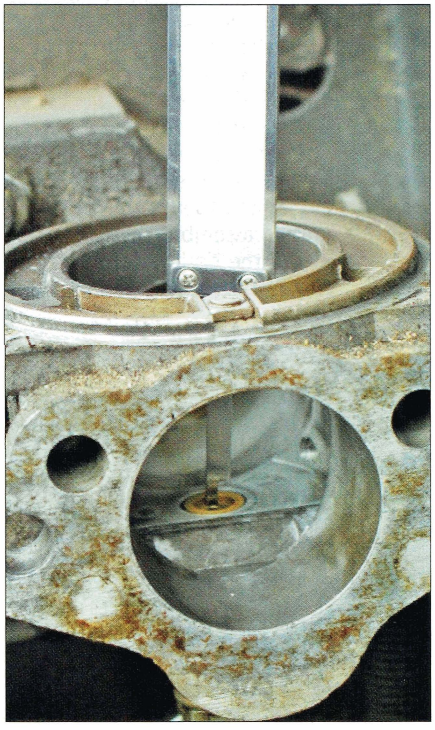
Shoulder of the needle should be flush with piston base, not proud as shown on the left hand example

pistons. *(Fixed needles with their shank shoulder base level with the base of the piston, and the spring loaded 'swing' needles with the base of the grey steel retaining collar level with the base of the piston.)* You can go further and remove each needle to check the needle code to see what is actually fitted, as it's not unknown for different needles to be found in each carburettor.

Needles are inscribed with identificati[redacted]is is an FX

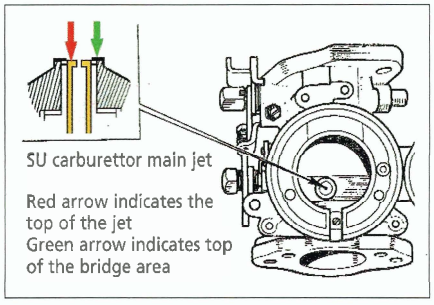
Obviously if odd needles are fitted then you can make no progress until a matching pair is fitted. If a different pair of needles are fitted to what is listed as standard then do consider what may be non-standard on your car as changes in even simple items such as air filters can demand a change of needle profile, so don't be put off at this stage.

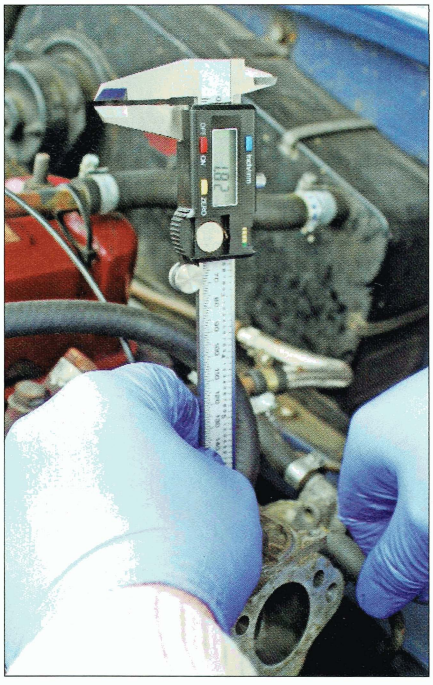
Now to the actual alternative set up that ideally needs a vernier caliper to measure the distance between the top of the bridge area of the carburettor and the top of the main jet. As an engine can cope with a richer mixture much easier than a weak one we will now adjust the



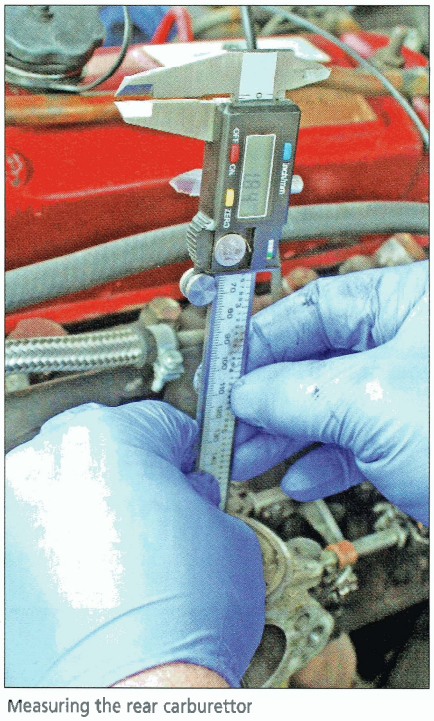
A vernier caliper is used to measure the distance between the top of the bridge area of the carburettor

jet with the shorter measurement to the top of the bridge to match the position of the other jet. With the needles confirmed as being in identical positions and now by doing the same for the jets we have synchronised mixture components.

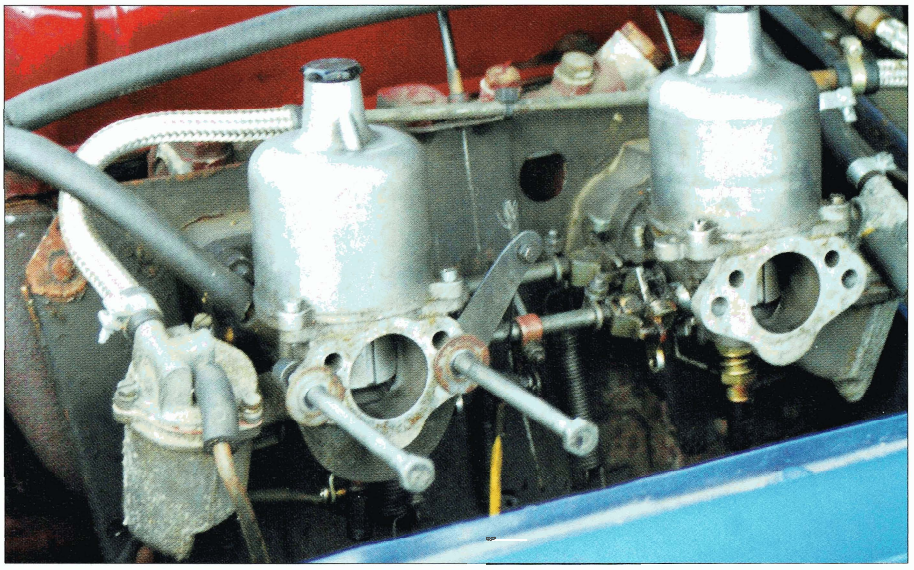




Measuring the front carburettor



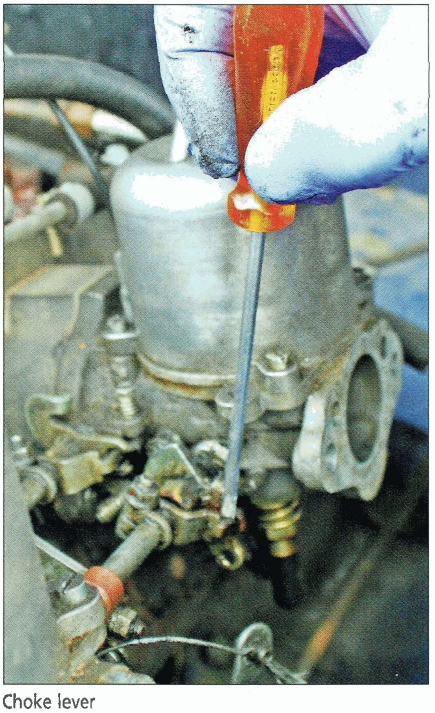
Measuring the rear carburettor



Test running on HS4s using the air filter bracket to hold choke assembly in place

The carburettors are reassembled and the process of actual mixture adjustment is now done on both carburettors, so if you adjust one by two flats or an eighth of a turn, then you mirror that on the other carburettor to maintain the synchronisation. This does mean that mixture adjustment is done faster and the engine responds more evenly.

In these days of technology there is wider availability of exhaust gas analysers to measure exhaust gas content. Obviously MoT testers use these and so it can be a useful tool for the DIY owner to use if they have access. Ideally engines tend to run best with CO *(Carbon Monoxide)* levels close to or above MoT levels. This why owners of classic MGs find there is a need to adjust mixtures to weaker states to pass, but the engine doesn't run as smoothly as it should. MoTs using an exhaust gas analyser measures total exhaust gas make up and so you still need to set each carburettor as described and any adjustments using the gas analyser should be equal and simultaneous adjustments made to both carburettors.



Choke lever

Refit air filter note the position of gasket

Exhaust gas analyser