

# SU CARBURETTORS

First of a three part series about tuning SU carburettors fitted to MGBs and many other classic twin carb applications

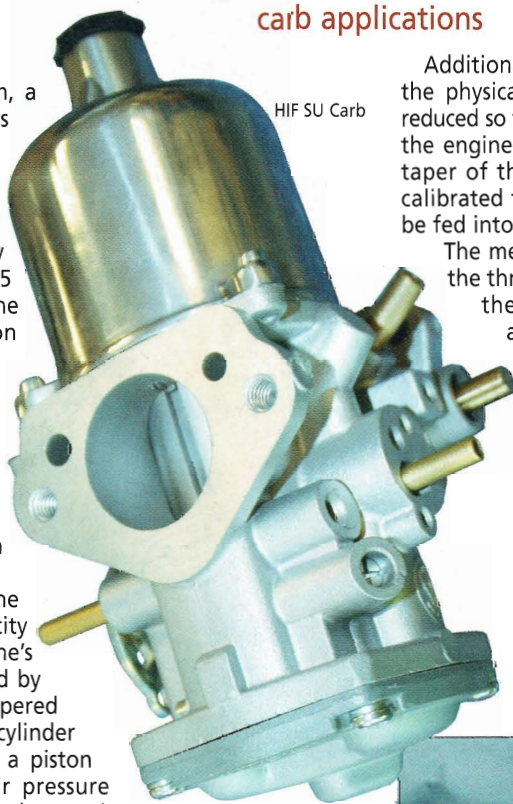
## Basic Principles

SU stands for Skinners Union, a company founded by brothers George and Thomas Skinner in 1905 on Euston Road, London. The SU sidedraught constant depression type carburettor was designed and patented by George Herbert Skinner in 1905 although originally branded the Union Carburettor it soon became known as the SU. In 1926 W. R. Morris acquired the business and subsequently SU carburettors were widely used in his Morris and MG products as well as many other British motor vehicles and they remained in use on production cars right up until 1993.

The basic principle behind the SU carburettor is that the quantity of fuel to air burnt in the engine's combustion chamber is metered by the rising and falling of a tapered needle moving inside a hollow cylinder or jet. The needle is lifted by a piston that responds to changing air pressure differentials within the carb that varies depending on the amount of air sucked in by the engine. This is in turn controlled by a butterfly throttle valve that when it is opened allows more air into the throttle mouth of the carb and as the volume of air being drawn in increases the piston rises, which in turn pulls the tapered needle up inside the jet and consequently as the needle rises so a thinner and thinner section of the needle remains in the jet and this allows more fuel to pass and mixed with the air flowing through the intake system.

If the engine is idling then there is little engine vacuum reaching the upper part of the piston to raise it so the thickest part of the needle is in the main jet and this provides the biggest restriction and relatively little fuel is allowed to pass. On the other hand if the throttle is open then there is a stronger engine vacuum reaching the top of the piston and this makes the piston rise with the needle leaving a much thinner part of the needle in the main jet so there is much more room for fuel to flow.

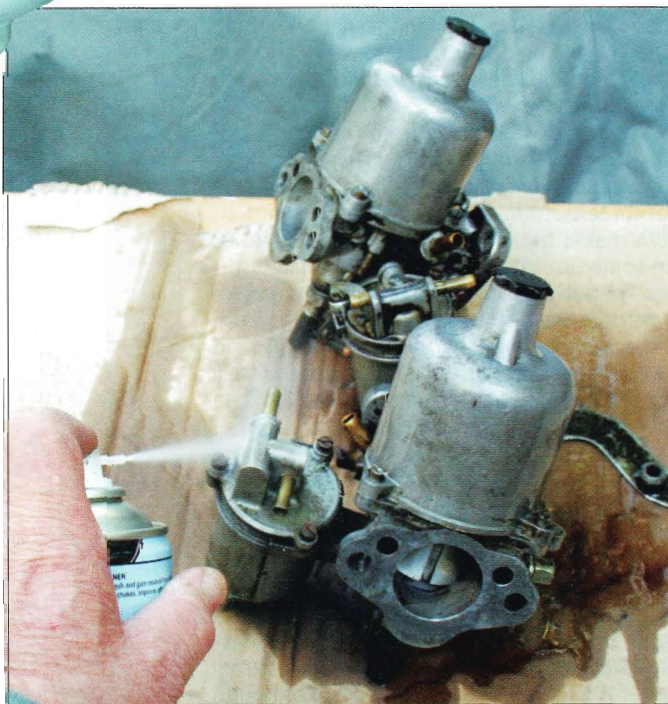
HIF SU Carb



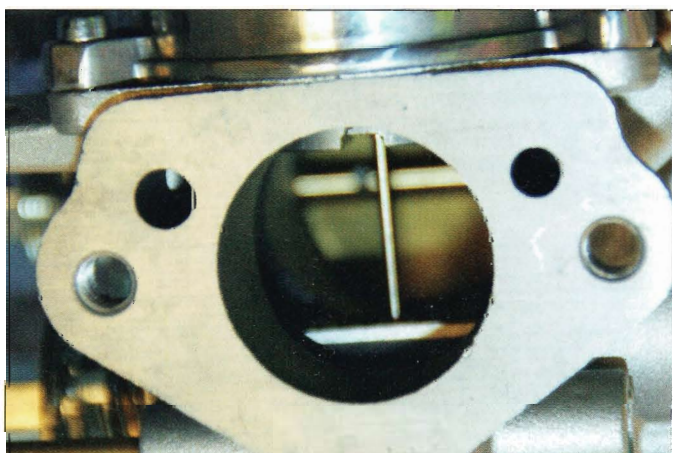
Additionally the fact that the piston has risen also means that the physical blockage that the piston creates in the airflow is reduced so the volume of air passing through the carb and entering the engine is vastly increased. This is where the accuracy of the taper of the needle comes in as the volume of fuel has to be calibrated to match the airflow volume if the right mixture is to be fed into the engine for best efficiency.

The mechanical choke mechanism works independently from the throttle controls, it operates by separate levers pulling the jets downwards which also richens the mixture to assist cold starting.

The SU is a relatively simple design that will usually work even when worn or badly adjusted, although it's always worth the effort to make sure that carburettor is operating correctly. Modern fuel additives can be problematic especially ethanol and if a classic MG's engine is left unused for a long period there is the potential for a build up of a sticky gum like deposit in the fuel lines and the carburettor. The only way to really clean an affected carburettor is strip it down and apply an appropriate SU carburettor or choke cleaner aerosol spray. This is also a good idea if your carbs have become oily and dirty as this makes it so much easier and more pleasant to work on them.



A thorough clean is worthwhile but be careful with delicate parts



As tapered needle rises more fuel is released, here the piston is fully raised

It is very important to treat the cleaning and dismantling of all the moving parts of the carburettors with great care and it's vital to reassemble them correctly. Areas to concentrate on are the piston and the intake throat of the unit along with the butterflies and spindle assembly. Also on HIF carbs note that the bottom plate of the float chamber/carb body can actually fit in several positions, but that only one is correct and it is all related to the indentation of the casting. Get it wrong and whilst the bottom plate screws on it may crush the main jet or cause the float to jam and not allow fuel to flow.



Once the units are clean you can examine the carburettor for wear in the throttle spindle which may cause air leaks, also check the throttle discs or butterflies. Some later SUs have poppet valves in the butterflies which can cause annoying air leaks, resulting in the engine revving up all on its own, without the application of the throttle, or just making it very difficult to adjust idle speed. Best cure for this problem is either to revert to the solid butterfly or solder up the poppet valve.

On reassembly of twin carb set ups as found on most classic MGs, it is necessary to refit both carbs together, holding the linkages in place as you slide the carbs onto the inlet manifold, but only just enough to expose sufficient thread of the manifold studs to allow the washers and nuts to be started. On some applications if you slide the carbs on fully then part of the carb body gets in the way of being able to get a couple of the nuts started. It may be helpful to take a photo before removing the carb assembly to ensure that the linkages go back correctly.

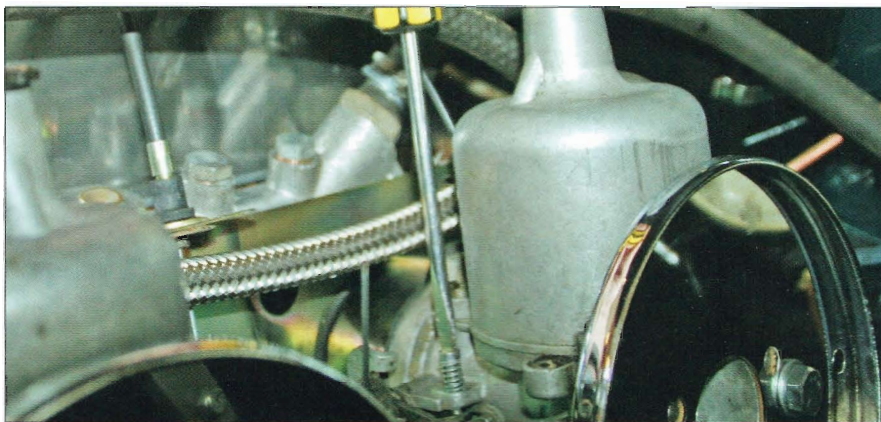
## Checking Before Adjustment

SU carburettors are simple to adjust but beware of the temptation to fiddle with them unnecessarily. It's easy to make things worse rather than better because of a simple error that is so easily overcome. This is that owners whose cars are not running as well as they could, come to adjusting their carbs by reading the manual and then following the basic advice which is aimed to get an engine that hasn't or doesn't run to start and run well enough for the process of fine tuning to be started.

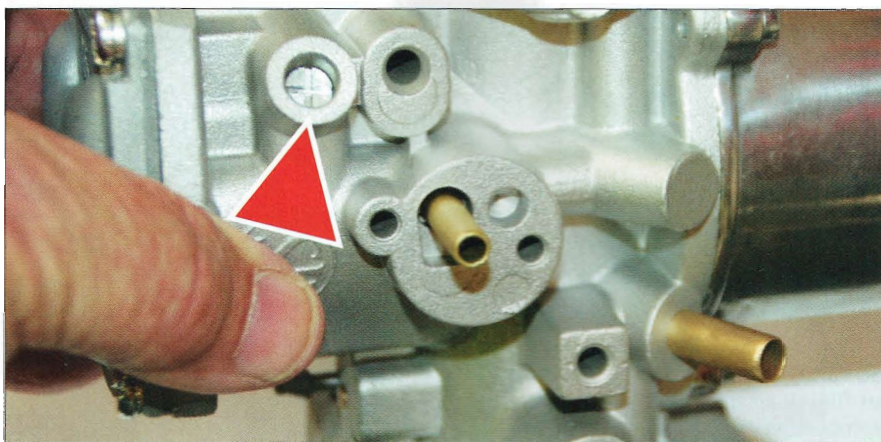
As most owners come from the position of their cars are running but perhaps not quite as well as they could, this is very much a case of three steps back and only one forward, so this makes the engine run so much worse or in some cases not at all, at least initially. It is far better not to revert all settings, like reverting back to the year zero, but to do a little simple checking and measuring and then make some fine adjustments and if they do not generate improvements then it will be easy to revert to where you started, so you are not going to be worse off. Look in the 'Adjustment' section later for more details.

If your engine is not running correctly always begin by checking the ignition system, most engine running problems are caused by electrical faults, such as ignition lead misfires, incorrect timing, or points out of adjustment and in more recent years poorer quality replacement parts. Always check and if necessary reset the timing to the book figures although it is not unusual to find that modern petrol may see the best running a couple of degrees or so lower than the original manual figures. Take time to check the point's gap, ideally with a dwell meter rather than with feeler gauges as this is more accurate and also averages out the lift for each of the distributor cam lobes and if there is a wildly pulsating reading this can indicate a worn cam or too much wear in the distributor.

Feeler gauges are still fine and of course should be used to check valve clearances before finishing with the ignition system by



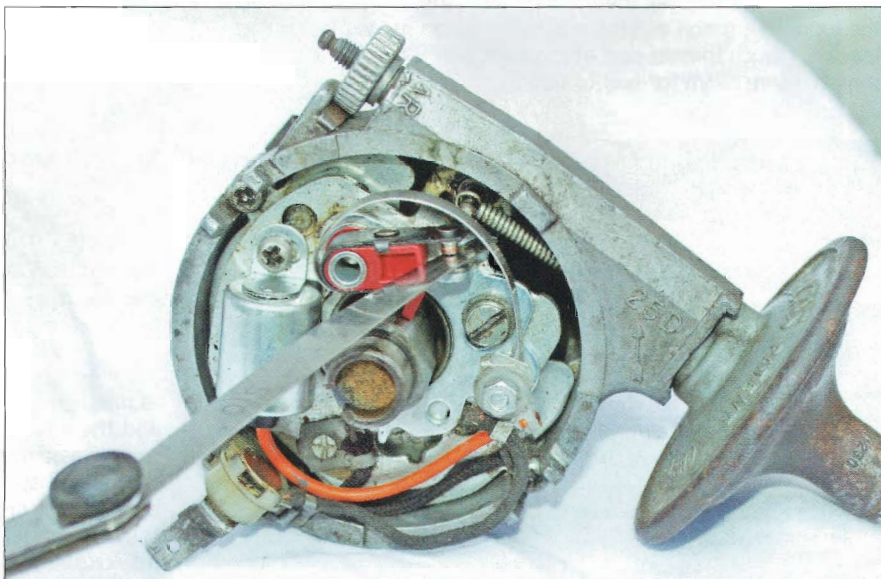
Idle adjustment screws



Mixture adjustment on HIF



Butterflies solid and with poppet valve

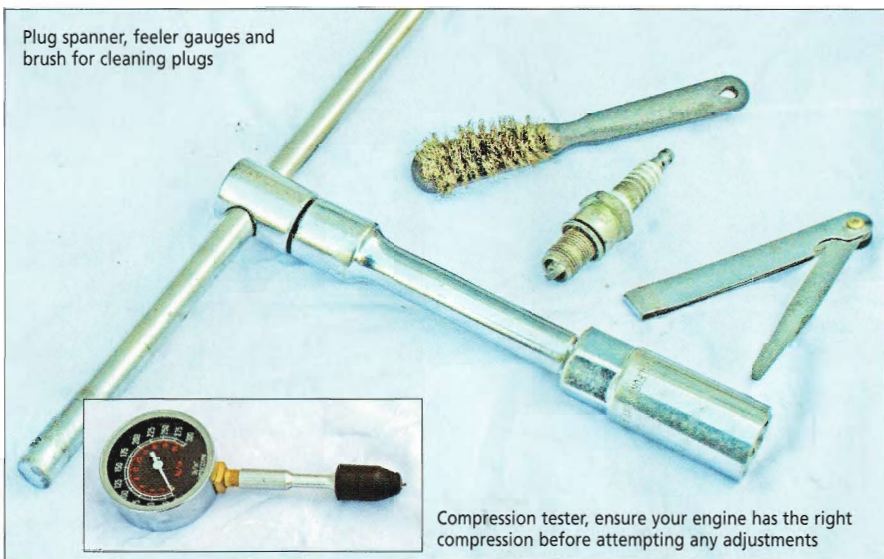


Distributor checking points gap





Adjustment of contact breaker set, after slackening off the attachment screw move the base plate by inserting a screwdriver blade into the notches provided



Plug spanner, feeler gauges and brush for cleaning plugs

Compression tester, ensure your engine has the right compression before attempting any adjustments



Plug electrode sooty black indicates too rich a mixture and here the encrusted deposit indicates some oil is being burnt too

examining each spark plug carefully before moving on to the fuel delivery system. Only when you are completely satisfied that every ignition component is working correctly should you turn your attention to the carburettors. Not everyone will have access to a compression gauge, but for full confidence in the state of the base engine measuring these will be very useful. Remember that the carbs operation is based on the airflow into the engine and if the engine has problems with compression then this shows it is not an efficient air pump and that has a direct negative impact on the carb operation and no amount of tweaking of the carbs will see them working properly.

The colour of the plug electrodes and the colour of the exhaust tailpipe will provide the most obvious guide as to how well the



These plugs all from an MGB tell that carbs are set unevenly

carburettors are adjusted. Take the MG for a short run to thoroughly warm up the engine. On your return carefully remove each plug in sequence and note the colour of the electrode. If you haven't already got a good quality plug socket and drive, it is well worth investing in one, it will enable you to remove the plugs without damaging them or burning your fingers. Too rich a mixture will give black sooty deposits on the plug electrodes, while too weak a mixture will leave white ashen deposits; the ideal setting gives a pale biscuit colour, a sort of digestive biscuit hue. At this point do be aware that modern fuels tend to generate more soot than leaded petrol and this will often leave greater sooty deposits around the edges of the plugs. This means that the previous immediate interpretation of soot presence indicating a rich mixture is no longer the simple guide it used to be so look for the colour of the electrodes primarily.

If the plugs for cylinders one and two are markedly different from three and four there's a good chance the carbs that are incorrectly set. Or the plugs may all be showing signs of being set too rich or too weak.

When replacing spark plugs always begin the threading process gently by hand and take great care not to cross the thread and damage the cylinder head.

*To be continued.*