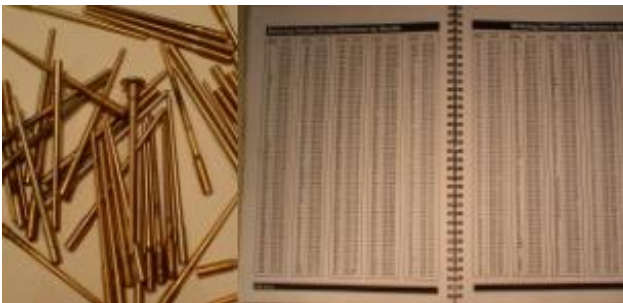


SU Carburettor Tuning



As owners of our beloved veteran/vintage cars, we always want the best and strive to obtain optimal performance at all times. The engine should run well at all speeds. This is easier said than done, as the needle profile must regulate the correct amount of fuel for the fuel/air mixture. The needles are ground "at the edge" and occurring wear of the shaft results in a too weak mixture and the engine overheats. Which one of the over 750 SU needles should I use and how do I know that these are running well through the whole driving range? The only guaranteed performance-check is on a rolling-road. There are many such specialised tuning-workshops, the problem arising being, who has enough sets of SU needles similar to the ones fitted and someone who is SU savvy? These are few and far between and if available are not at the lower end of the service-cost bracket.



Which is the needle (in the haystack)?

Method

If you're prepared to spend a little time and with the minimum cash-outlay, it is possible to modify the needle that you have to a perfect mixture over the whole driving-range. In fact you file flats of the same size on the needles. You will learn how to and what you need in the following:

You need

For the work you need:

- **A 12 V onboard optical exhaust-analyser**
With a 6 V car, you'll have to have an external power-supply. Choose the diode type, as the colours are easier to see out of the corner of your eye when driving, instead of trying to read the dial.
- **A smooth-cut flat swiss-file**
- **A few needles as backup**
- **Perhaps a magnifying-glass**

Preliminary checks

Presumably we are dealing here with a multi-carb set-up, but single-carb engines can also be checked this way.

- **Are the correct needles fitted?**
Check the needle-code stamped on the needle-shank and compare it with the car-manufacturers specification, or alternatively in the SU catalogue.
- **Piston drop-speed on the carbs the same?**
- **Has the damper oil in both bodies the same viscosity?**
rather thicker than thinner – as my wife agrees to that...
- **Both dampers in same condition?**
Are the damper-valve-bodies the right length and are the damper-caps breather/non-breather in accordance with the domes in the right relation?
- **Are the springs similar?**
Same length +/- 1cm, wire thickness the same and the same number of coils? New springs have a colour-code, but this tends to flake off in the oily, hot dome environment.

Check your car

Before starting any work, there are a few points that have to be checked:

- The engine has to be in good order and mechanically sound.
- Dwell-angle and timing should be spot-on.
- Tappits and cylinder-compression correct?
- The right plugs are fitted?
- The engine should be at normal running temperature when tuning.

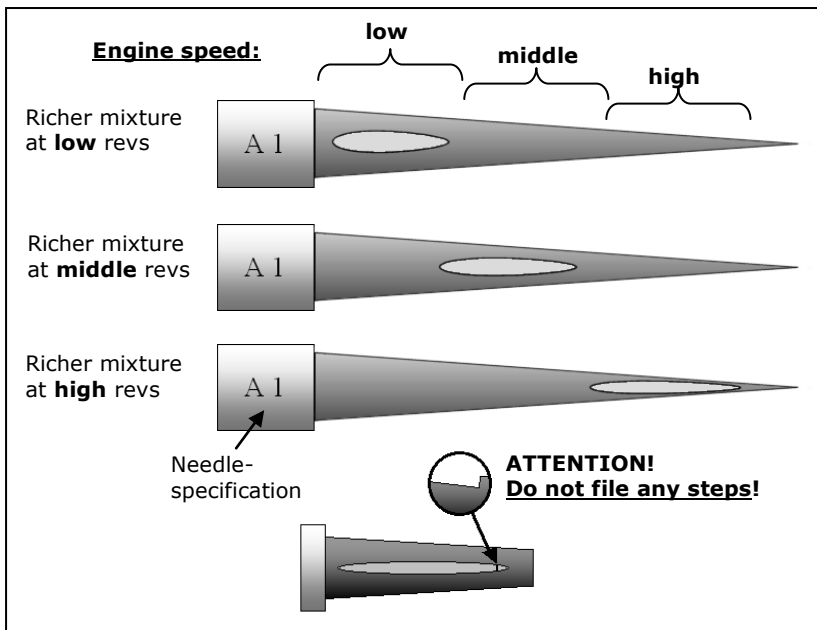
Exhaust-analyser

Place the sensor in the exhaust and mount the gauge on the dash-board. Probably you'll have to put the sensor-cable through the interior/boot of the vehicle.

Take the car out for a short ride to see that everything is working correctly and if you're lucky, the diodes will glow green in all engine-rev ranges.

Check that the analyser is functioning correctly by richening one carb (adjusting-nut/screw) and observing the result. If the diodes are green, disengage the clutch while driving, immediately switch off the ignition, coast to a stop and check the plugs:

- Light grey – mixture too weak
- Light brown – correct combustion
- Black – too rich mixture



Filed flats on the needle at different speeds

Needle Theory

The needle meters the amount of fuel needed by the engine by dipping centrally into the orifice of the main-jet. i.e. the larger the diameter, the less fuel can pass it, vice-versa the smaller the diameter, the more fuel. Therefore the needle is tapered to provide less fuel at low engine revs, vice-versa more fuel at higher engine revs. Needless to say then, that if an engine is running roughly (spitting back, misfiring) at high engine revs no doubt the needle is too thick in this area. The needle should then be replaced by one which is thinner towards the point. But which one? And by how much? Not so easy a task with so many needles available and they do not keep to a regular pattern, i.e. needle A1 is not necessarily weaker than needle A2, but can have a completely different profile. Now one sees how many sets of needles one must have for even simple tuning.

The solution: file your needles

But there is light at the end of the tunnel. It is possible to tune the needles. The first idea that comes to mind, is that we could remove some of the material round the circumference of the needle, therefore making it thinner i.e. richer mixture. Obviously, by paring metal, the needle will become thinner, therefore allowing more fuel to pass it, hence a richer mixture. Needles are produced to extremely fine tolerances and to get two (or three) both exactly the same is nigh on impossible. You`re going to measure yourself crazy with a screw-guage; correct diameter and same distance along the needle. A much simpler method is to file a flat along the part of the needle that is running too weak -see accompanying sketch above.

File workshop

This is where the fun starts!

To make life easier, blacken the whole of the needle first with a felt-tipped pen – it gives a much better contrast.

If the needle is running weak in mid-range, you should then file a flat in this area. It`s very important that you do not *file a step* as this will give a sudden surge of fuel which is to be avoided. Of course, this is only a rough and ready method, but it works, even though you may expect to ruin a pair of needles if at the first attempt too much material is removed.

The greatest advantage with this method is that even just with the naked eye, holding both needles

next to each other, you will see immediately if the length and breadth of the filed flats are the same. It`s quite possible that the use of a magnifying-glass will help things.

As previously mentioned, you`re going to



Filing must be done very carefully

have to remove and replace the needles several times before optimum performance is achieved – keep your eye on that exhaust-analyser!

So have fun breathing and if any problems crop up that you`re not quite sure about, please give me a call.

Bob Tyler

BOB

Carburettor Restoration

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