

1. Basic Adjustment Strategy

The trick to tuning Skinners Union (SU) or Zenith Stromberg (ZS) carbs is to understand that there are two things you need to get right: the air flow, and the fuel mixture. While they are interconnected, they are also independent, and need to be measured and adjusted independently. SU carbs were used on the early Triumphs, while ZS carbs were used on the later ones. Either type of carb can be found on [TR4s](#). The design of each is quite similar; thus adjustment is performed in the same manner for either type. If you would like to read more detailed information about how your SU or ZS carbs work, there are excellent Haynes manuals for each of these carburetors.

Special Tools

- You will probably need to arrange to buy or borrow a Unisyn flow meter. The Unisyn is the usual gauge for getting the air flow balanced between the two carbs. This costs about \$20 and is simple to use. It consists of an adjustable opening (same size circumference, but with a disc on a threaded rod that you can screw tighter or looser) that you use to set the level of a little float that rises or falls in a glass tube at the side of the gauge.
- For the fuel mixture, one helpful device is called the Gunson ColorTune (maybe ColourTune, as it's a British co.). This is a spark plug with a crystal pressure- and heat-resistant window in it that lets you see into the combustion chamber while the motor is running. The color of the flame indicates the mixture richness. It costs about \$40, and while it's not absolutely essential, it makes life so much easier that it's worth the cost.

If you don't have a Gunson, the standard directions are included here for determining correct mixture (step 4 of the Adjusting Mixture procedure).

- For some ZS carbs, you will need a special mixture adjusting tool. This is a special two-part wrench that is inserted through the top of the carburetor to adjust the metering needle while preventing the air valve from rotating within the carburetor.

Terminology

To tune SU or ZS carbs, first locate the following components:

Throttle linkage nuts. These are the things that connect the throttle linkage (the bar connected to your foot through whatever means your car uses, cables or rods) to the carburetors' throttle levers.

- Throttle stop screws. These set the idle speed for each carb, and are located typically behind the dashpot, near the connection of the throttle linkage.
- Mixture adjusting nut. On early SU carbs, this is the lower of the two nuts at the very bottom of the carburetor. Later SU carburetors of the HIF type have integral

float chambers, on which the mixture is adjusted by turning a screw. Some ZS carbs do not have adjustable mixture. ZS carbs that do allow mixture adjustment either You'll need to experiment (and I explain how) to see which way makes this richer and which way makes it leaner.

- Lifting pins. (SU carbs only) These are little wobbly metal pins under the dashpot. When you push up on the pin, it raises the piston in the dashpot. Find these; they're crucial if you don't have a Colortune. If you don't have them, can't find them, or have a ZS carb, you can raise the piston with a flat-bladed screwdriver pushed down the throat of the carb and twisted or levered to lift the piston.
- The bridge. This is the part inside the carburetor, where the gas jet opens into the airstream. You'll see a needle inside the jet, and the jet itself should be a few fractions of an inch down from the bridge itself. The jet is the brass tube that sits in the center of the bridge, with a tapered needle poking down into it.
- The choke linkage nuts. Comparable to the throttle linkage nuts (and usually the same size), but on the linkage that goes between the choke cable and the mixture adjustment mechanism. They make sure that both carbs are enriched when you pull on the choke. Your car may have no choke linkage, but a split choke cable which connects to each carb, in which you can forget about these...

2. Before You Even Touch the Carbs!

Start with the engine warmed up to operating temperature and perform your standard ignition tune-up (points gap, timing, spark plug gap, new condenser, etc.) first. All of these things can affect the setting of the carbs, which should be adjusted last, if at all! After being properly set, the carbs should rarely need further adjustment. If you've got a timing light and a dwell meter, you can verify the ignition components independent of the way the car is running. When it's warm, shut the motor off and remove the air filters. Of course, it helps if the carbs are in good mechanical condition as well. But you can consider a rebuild once you have gotten things working first!

3. Balancing The Air Flow

If your car has multiple carburetors, the air flow needs to be balanced amongst all carbs before the mixture is adjusted. If you have only one carb on your car, you can proceed directly to mixture adjustment!

1. Begin by balancing the air flow. To do this, first loosen the throttle linkage nuts. Leave them connected, just loosen them half a turn or so.
2. Back out the throttle stop screws till you can see that they are just touching the throttle stop. Then open each carburetor (that is, lower the throttle stop screw) 1-1/2 turns of the throttle stop screw and start the engine. It will probably idle at about 2000 RPM; don't worry.

3. Put the Unisyn over either carb and adjust the orifice in the Unisyn till the little float at the side rests at the middle of its graduated tube. (Pre-diagnostics: if the idle drops and the car wants to die when you slap on the Unisyn, the carb is too rich; if the idle soars upwards, it's too lean.) Hold the Unisyn over the carb for only long enough to see the level of the float, then remove it.
4. Place the Unisyn on each carburetor in turn to check its flow, adjusting the throttle stop screws until all carburetors register the same position on the graduated tube of the Unisyn. (The float will probably move either up or down in the tube, which is why you want to center it in Step 3.) When both carburetors flow the same amount of air, tighten the throttle linkage nuts, adjusting for the amount of free-play between the linkage and the throttle stops that your manual calls for (probably about 0.006"). Your goal should be to achieve the lowest possible idle with both carbs balanced and the engine running smoothly. (Note that the idle speed will very probably rise as you get the mixture correct.)
5. If you've taken more than five minutes to do this, rev the engine to over 2500 RPM (assuming the idle isn't already that high) for thirty seconds or so to clear the spark plugs. Then adjust the mixture.

4. Adjusting The Mixture:

Note: in the following procedure, one "flat" is the basic increment of adjustment, and refers to 1/6 of a turn of the mixture adjusting nut. This corresponds to the flat faces on the nut.

These instructions are for ZS carbs or SUs with separate float chambers. You will need to check in your shop manual to see whether you turn the mixture screw to the right or the left to make it richer or leaner. (We may add the information here some day...)

1. Shut the car off and loosen the choke linkage nuts, if you have any to loosen!
2. Adjust the mixture nuts (screws) fully lean. Check your shop manual to make sure you are adjusting them the right way!
3. Now enrichen each carb an equal amount -- two full turns of the adjustment nuts (screws). Then start the car.

Note: In the following step, you might want to consider adjusting the carburetors one-half a flat too lean, as the mixture will be enriched when you put the air filters (which restrict air flow) on at the end of the tuning process.

4. Raise the lifting pin (or use a screwdriver if you don't have the pins) so that the piston rises no more than 1/16". Listen to the engine's exhaust note and compare it to the following conditions:
5. If the exhaust note rises and stays high until you drop the piston, this carburetor is adjusted too rich. Adjust the mixture one flat leaner, then repeat Step 4.
6. If the exhaust note falls and the car sounds as though it is going to stall, this carburetor is adjusted too lean. Adjust the mixture one flat richer, then repeat Step 4.
7. If the exhaust note rises briefly and then settles back down to something like the original RPM level, this carburetor is set correctly. When you have achieved this setting for all carburetors, continue with Step 5.
8. Tighten the choke linkage nuts, if applicable, so that the choke cable will pull an equal amount on both mixture nuts when you pull the knob.
9. At this time, I find I usually have to adjust the idle again because getting the fuel mixture right usually changes the idle speed. Since you know you have the throttles synchronized, I normally just adjust the idle without loosening the throttle linkage. The easiest way is to screw one of the screws out till it doesn't even touch the throttle stop, then use the other to

get the idle speed right. When that's done, you can screw the other stop screw down till it just touches the stop on that carb and you're set.

10. Replace the air filters and go for a test drive!

5. Special Notes

SU and ZS carburetors are most fuel-efficient when slightly lean, and provide the most power when they are slightly rich. You can use this knowledge to provide a certain amount of tuning for the kind of driving you do. If you learn to read spark plugs, you can get a basic idea of what your engine's condition is and make fine adjustments to the mixture nuts accordingly.

If you have a ColorTune, you simply install it in place of one of the plugs, then adjust the carburetor that feeds that cylinder (the front carburetor for 1 & 2, the rear for 3 & 4). The ColorTune will let you see the color of the flame. White flashes mean too lean; yellow flame means too rich. Blue (like a Bunsen burner) is correct, and blue with a faint orangish tinge is the best for power.

You can also modify your car's throttle response characteristics slightly by adjusting the viscosity of the oil in the dashpot damper. SU and ZS carbs are set up so that a thicker oil will resist the piston's attempt to rise in the dashpot for just long enough that the engine's increased load (when the throttle is opened) will pull more fuel across the bridge; this enriches the mixture and temporarily bumps power up to help the engine achieve higher speed more readily. For light damping, Marvel Mystery Oil is excellent, engine oil can be used for heavier damping.

If you modify your engine, you will probably need to modify your needles, as it is the needle profile that determines the mixture curve for different air-fuel loads.

If you experience uneven idle, hunting, or an idle that changes (rises or falls) as the engine's temperature climbs or drops, you probably have vacuum leaks. The most serious fault on most old carbs is wear in the throttle shaft area. To test for this, spray some carburetor cleaner on the outside of the throttle shaft; carburetor cleaner is non-combustible, and if the engine speed drops, it means some of this

is getting into the air stream from outside the carburetor. You may also have leaks from the manifolds, from tubing such as the vacuum advance line to the distributor (if fitted), or from other places; the carb cleaner trick works well for locating those leaks as well.

Other problems that SU and ZS carbs experience involve dirt in the dashpot and occasionally in the float chamber. The dashpot is a precision piece of machining that involves very close tolerances so that the piston doesn't stick or bind when it rises and falls. A little grit between the piston and the dashpot can make the car jerk and sputter. Take the dashpot off, wipe the insides down with carb cleaner and a lint-free, clean rag, then reinstall it, getting the screws down tight. Also, don't swap the pistons between dashpots; they're matched to one another so that the clearance between the piston and the wall of the dashpot makes a tight seal but permits easy rising and falling.

Dirt in the float bowl basically shuts off that carburetor (or can make it flood open, depending on whether the dirt is wedging the valve open or closed). You can try rapping on the float bowl with the handle of a screwdriver, but your best bet is to take the cover off, clean out the valve fittings, and reinstall everything, with a new fuel filter for good measure.

Some older SU models also have adjustable floats, in which you need to set the float height (which basically equals the fuel level in the float chamber) by bending a brass rod. These carburetors were replaced in the mid-1960s with carburetors that had fixed, plastic floats which are basically trouble-free unless abused. The stop at the back of the floats can break if they are installed badly, and the brass pin that holds them in place can wear an oval hole in the float pivot. New floats are fairly inexpensive and aren't a bad idea if you're doing a rebuild.

Grose-Jets are very popular with some people and a big pain for others. It appears -- and this is just conjecture -- that Grose-Jets work best in cars with adjustable floats. The standard failure for Grose-Jets is to flood the carburetor.