ADJUSTING THE CLOSING POSITION OF THE 2CV SECONDARY CHOKE BUTTERFLY

By Graeme Dennes

Er, adjusting what??? Er…, why?? With your 2CV, have you found a situation where the engine idle speed is too high and you weren't able to correct it? Have you experienced rougher idling which you also couldn't correct? If so, the following information may be of assistance.

Background: The official Citroen 2CV workshop manuals show that the Solex dual-choke 26-35 CSIC carburettor was fitted to the 2CV from 1978 onwards. In a correctly set up carburettor with the engine idling at 800-850 RPM, the carburettor's primary choke and butterfly are supplying the required quantity of air/fuel mixture to the engine, while at the same time, the secondary choke is fully closed off by the secondary choke butterfly. (The secondary choke butterfly opens only at the higher throttle settings.)

The underlying problem and solution described here apply in principle to any dual-choke, progressive-action carburettor feeding a *single air/fuel stream* to an engine.

Photo 1 at left shows the bottom of the carburettor with both butterflies closed. The smaller butterfly on the left controls the quantity of air/fuel mixture from the (smaller) primary choke, while the larger butterfly on the right controls the quantity of mixture from the (larger) secondary choke, the energy source of the 2CV's unbridled power!

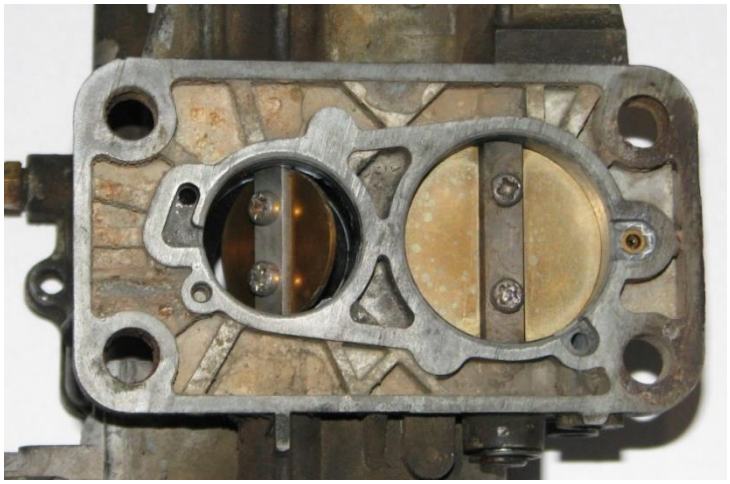

Photo 2 at left shows the butterflies as they appear with a slightly open throttle. The primary butterfly is partially open, while the secondary butterfly remains fully closed.

The typical symptoms: Should we find that the engine idle speed is too high, we normally bring it back to standard by turning the idle speed adjustment screw anti-clockwise. Sometimes upon doing this, we can find that the idle smoothness isn't at its best, so then we need to enrichen the fuel mixture by turning the idle mixture adjustment screw anti-clockwise to correct it. This situation may be repeated over time…

This is what is happening: Should the secondary choke butterfly become ever-so-slightly open at idle *for whatever reason*, that additional small air flow into the engine will be enough to increase the idling speed, which we correct.

At the same time, the small venturi depression in the secondary choke from the extra (small) air flow will not normally be sufficient to draw in fuel from the secondary choke fuel system, so the extra air being taken in will cause the net air/fuel mixture reaching the engine to be leaned, causing a rougher idle, which we correct.

Let's analyse this: Say we start with a correctly setup 2CV running at idle, and for the sake of the argument, say we could slightly open the secondary butterfly by some means. This will allow a small volume of extra (unwanted) air to enter the engine, adding to the air already entering via the primary butterfly. This increase in the total air flow into the engine causes the idle speed to increase. As the extra air entering via the secondary butterfly will not be carrying fuel, the extra air leans the air/fuel mixture reaching the engine. (High idle speed, lean mixture.) Then we adjust the idle speed adjustment screw anti-clockwise to reduce the total air volume reaching the engine, sufficient to bring the idle speed back down to the correct setting. (Correct idle speed, lean mixture.) Then we turn the idle mixture adjustment screw anti-clockwise to enrichen the air/fuel mixture reaching the engine, sufficient to result in a nice smooth idle. Ah, that's better. (Correct idle speed [air flow] and correct mixture [fuel flow].) However, we've been tricked into believing all is good, when under the bonnet it definitely isn't!

Out on the road, the slightly open secondary butterfly may also impact the engine smoothness across the throttle range and RPM range, being that the primary and secondary butterflies are no longer synchronised as Citroen intended. We may notice performance issues when driving the car, but we just can't seem to nail the cause!

The final symptom: At some point, we may find that the idle speed adjustment screw has been unscrewed to the limits of its threads, and yet the idle speed is still too high. We may also find that the idle mixture adjustment screw has been unscrewed to the end of its travel, yet the idle smoothness is still not as we would like. Both screws have run out of adjustment. *HELP!! Something is very wrong. Not happy Jan!*

The above discussion presupposes that the carburettor and its base gasket form an airtight seal with the inlet manifold, and the carburettor base mounting nuts are firmly secure. Any air leakage into the inlet manifold from around the base of the carburettor acts identically to the unwanted air being taken in via the partially open secondary butterfly. The result is the same. All other aspects of the carburettor are presumed to be correct, such as the idle mixture screw needle is not bent or damaged, the fuel floats are in good condition, the floats can move freely without binding, the float height is correct, the float valve is serviceable and firmly seated, all carburettor jets are clear of dirt, all jets are firmly seated, all jets are of the correct size as specified for the car, the top cover gasket is in good condition, the top cover securing screws are firmly seated, etc, etc.

Well, Baldrick, what's your cunning plan? We need to ensure the secondary butterfly is doing its intended job of *fully closing off the secondary choke when the carburettor is at its idle position.* To do this, the carburettor needs to be removed from the vehicle to gain visual access to the secondary butterfly. The secondary butterfly closing position is affected by the secondary butterfly adjustment screw, which can prevent the butterfly from fully closing off the secondary choke at idle – the key issue at hand. Whew! This report is to help the reader ensure the secondary choke butterfly in your 2CV *does* properly close off the secondary choke at the idle position as Citroen intended.

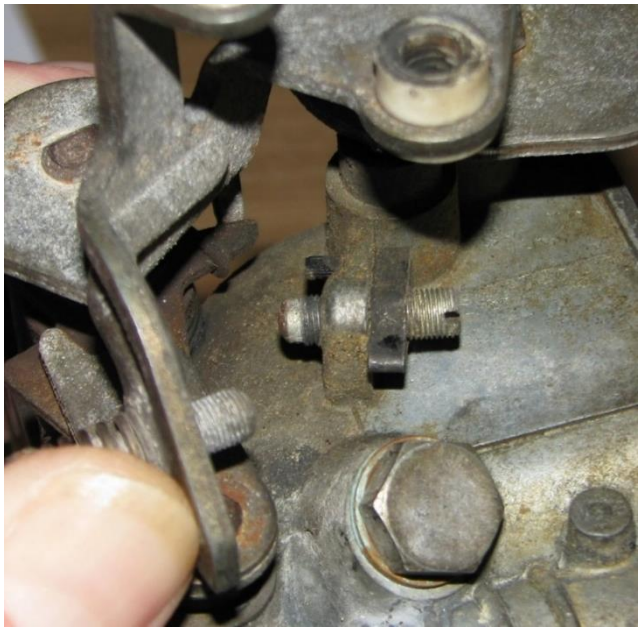

Photo 3 at left shows the secondary choke butterfly closing position adjustment screw in the centre of the photo. Note the small spring clip fitted to the adjustment screw to prevent it from moving. (This carburettor is from a 1987 2CV.)

On at least one earlier model 26/35 CSIC carburettor, the adjustment screw was located on the opposite side of the carburettor, attached to the secondary choke butterfly shaft.

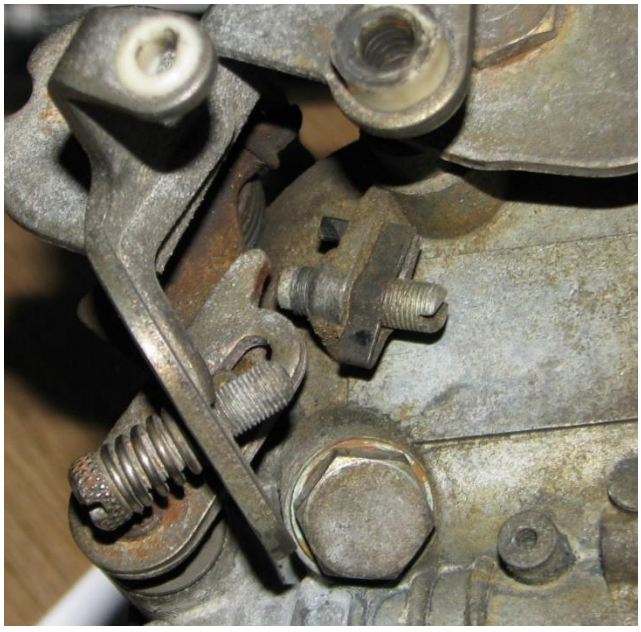

Photo 4 at left shows the "stop" arm which is attached to the secondary butterfly shaft. In the photo, it's the metal fitting positioned immediately behind the idle speed adjustment screw and spring at the lower left. The butterfly adjustment screw has been unscrewed a few turns so its tip is well clear of the small tab on the end of the "stop" arm to ensure the secondary butterfly can fully close when the throttle is fully closed, our raison d'être. (As an aside, the large hex-headed "bolt" to the lower right of the idle speed adjustment screw is a removeable metal cap and washer which provides screwdriver access to the primary choke main jet.

To the best of the writer's knowledge, Citroen never intended the secondary butterfly adjustment screw to be adjusted, being that no formal Citroen procedure for doing so has been sighted by the writer. It was adjusted and set during manufacture, and that's it. In fact, as a deterrent to any inquiring minds, a moulded plastic cap was permanently fitted over the adjustment screw to act as a reminder that it's not adjustable, just in case we should ever become inquisitive about it…! *(Mmmm, he says knowingly).*

In the absence of a formal procedure for performing the secondary butterfly adjustment, and to bring any black-art secret knowledge out into the open, the writer prepared the following procedure which ensures the carburettor's secondary butterfly is adjusted and doing its job as Citroen intended. Here we go!

1. Remove the carburettor from the car and place on a clean workspace.
2. If the secondary butterfly adjustment screw is fitted with a plastic anti-tamper cap, cut off the top of the cap to expose the screw head. In Photo 3 and Photo 4 above, the plastic cap has been completely removed from the adjustment screw.
3. After ensuring that the carburettor's throttle assembly is in its fully closed (anti-clockwise) position, turn the secondary butterfly adjustment screw anti-clockwise until its tip is well clear of the "stop" arm tab, per Photo 4 above.
4. Rotate the throttle assembly clockwise to its fully open position (ie with both butterflies fully open), then release it, allowing the secondary choke butterfly to "snap" back into its closed position, ensuring the tip of the butterfly adjustment screw continues to remain clear of the "stop" arm tab. Repeat this several times until satisfied that the secondary butterfly has positioned itself centrally within the secondary choke and is fully sealing off the secondary choke. Ensure the butterfly is not binding across its movement range. Repeat this a few more times, just to be sure! Just to be sure!
5. Turn the butterfly adjustment screw slowly clockwise until the tip *just* contacts the tab on the "stop" arm but does not move the "stop" arm, then turn the adjustment screw anti-clockwise by half a turn to ensure the screw tip is *not* in contact with the "stop" arm tab. If necessary, repeat steps 3 to 5. Note: If the tip of the adjustment screw touches the "stop" arm tab at idle, *the secondary butterfly will not be able to fully close,* the genesis of this report! The screw tip must not/never touch the "stop" arm tab at the idle position. On the other hand, if there is too much gap between the screw tip and the "stop" arm tab, it will delay the onset of the opening of the secondary butterfly, changing the designed synchronisation between the two butterflies.
6. Return the carburettor to the car and set the idle speed and idle mixture adjustments. Now that the secondary butterfly adjustment screw has been correctly set, the carburettor's idle speed adjustment screw may need to be screwed inwards (clockwise) to increase the idle speed to the required setting, and the idle mixture adjustment screw may need to be screwed inwards (clockwise) to lean the idle mixture sufficiently so as to obtain a smooth idle.
7. After the car has been taken for a run and fully warmed up, repeat the idle speed and idle mixture adjustments.
8. Take the car on an extended drive of say one to two hundred kilometres. This will allow the secondary butterfly to fully seat itself in the secondary choke. Turn the butterfly adjustment screw two turns anti-clockwise, then repeat step 5 above.
9. Take the car for a run to fully warm up the engine, then recheck the idle speed and idle mixture settings.
10. All done.

Note: The writer first read about the secondary choke butterfly issue in an English automotive textbook in the late 1960s. It was again brought to the writer's attention in a brief response found on an internet forum several years ago.