

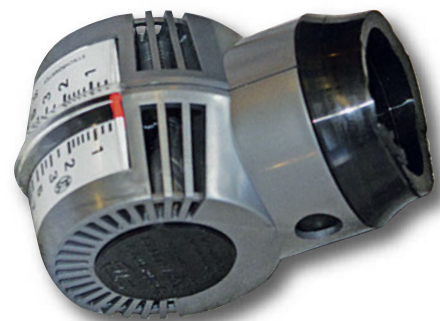
# S F 6

## BALANCING ACT

One of the differences between servicing a Chimaera and a Tuscan is that they have a different engine. No surprise there. Therefore they also have a different engine inlet system, with a standard Chimaera having a single throttle butterfly controlling all eight cylinders and the Tuscan having six individual throttle butterflies, one for each cylinder. If you are of my vintage you may remember having a car with twin (or more) carburetors, which you had to get to suck in the same amount of air through each to get optimum power. A speed six engine is no different in principle; you want each inlet to suck in the same amount of air, except there are six inlets on a speed six.

The old fashioned way of balancing throttles was to use a length of flexible pipe with one end in your ear and the other held a set distance from the carburettor inlet. You would then use the pitch of the air rushing past the pipe to judge if adjustment was required. There is no reason why this approach would not work as it used to, but times have moved on and the relative price of equipment has come down. Therefore I bought a balancing meter (which are available from a number of outlets). This is basically a damped flap with a needle on it. The more air that goes past the flap the more the flap moves and therefore the needle moves. Unfortunately to get the one that I bought to work properly I had to take it out of the box and cut some of the rubber off it, otherwise it is too long and presses on the throttle butterfly, which is a bit of a problem if you are trying to adjust this bit.

The first thing to do, if it is not already off for another reason, is remove the main bonnet from a Tuscan. As this has been documented elsewhere I am not going to go into detail here, but in essence, open the service bonnet, undo and remove the four bolts and washers then unclip the two rear clips. Lift the back of the bonnet so that it is almost forty five degrees then lift up and back at the same time.



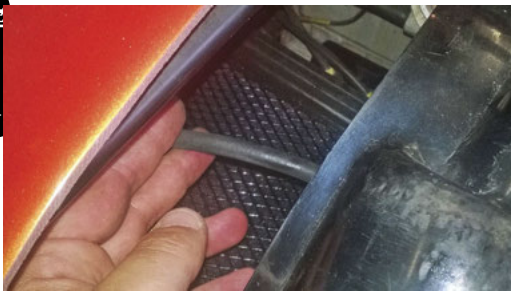


Access would be easier if the scuttle panel, the bit across the bottom of the windscreen, was removed, but it is perfectly achievable with this in place. In my opinion there is no reason to remove it, as the time to do so is a lot more than the extra time that it takes with it in place.

Each throttle body is independent and operates independently. In effect they are all separate. However only one is operated by the throttle cable and this then operates the two either side, which in turn operates the ones next to them, until all of them are operating. However, as this is a mechanical link, it means that there is the opportunity for movement to creep in over time, which will potentially affect performance, and therefore needs to be checked and if necessary adjusted. I do this annually as part of regular servicing.

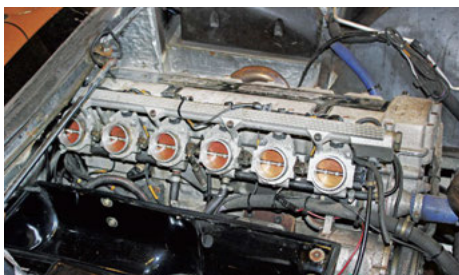
After the bonnet is removed, the next part that you will need to remove to be able to measure the flow is the air-box. This is held in place by three clips and two bolts. The bolts (*which have an Allen key head*) are between the inlets of cylinders two and three and four and five. On my Tuscan they are obvious as the brackets are clearly visible where they are attached to the top of the air-box. Two of the clips are on the outside edge of the air-box and hold the top to the bottom. These normally have a split pin through them to stop them coming undone accidentally. The third is on the inside, about halfway along the back between the air-box and the engine. This is a James Herriot moment and requires your hand going between the two. On my car it is possible to do this with the engine at operating temperature as long as you are careful.

 Courtesy of: Mike Hardy



The final stage is to remove the connections to the air-box top. These are one electronic connection to the sensor in the middle at the top and three hoses, two (*one small and one large*) at the front and one small one at the back which you cannot get to until the top is halfway off. To remove the air-box top I gently wiggled it off the throttle bodies towards the driver's side, then pulled it forwards, disconnecting the aforementioned rear hose before removing it fully. After removing it you can see the throttle bodies in all their glory, and the butterflies within.

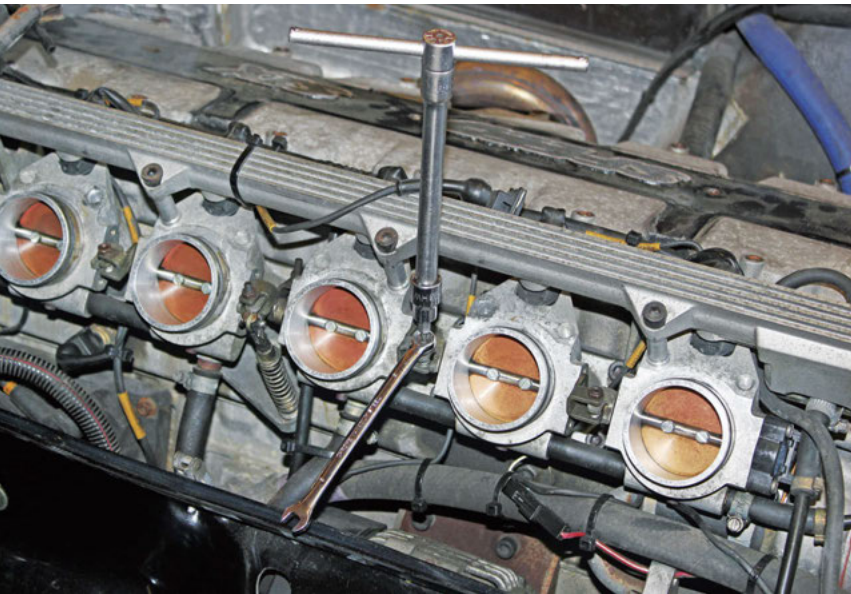
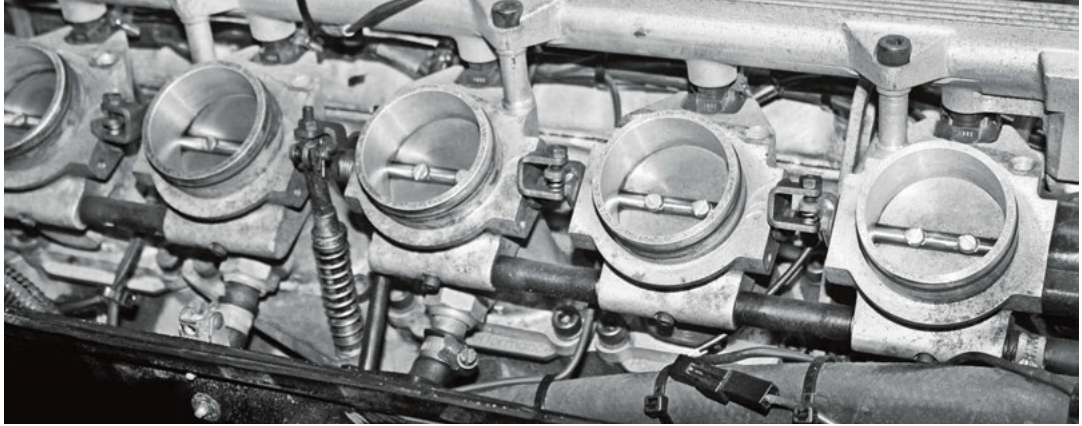
Now the real start can commence. I get the engine running stably then put the flow measurement tool onto throttle body number three, leave it there for the reading to stabilise and then make a mental note of what it the measurement is. I then move the tool to throttle number four and note the reading again. I am looking for the two readings to be the same. Basically the process is the same for all the other adjacent throttle bodies, and if lucky they will be the same.





# SP6

## BALANCING ACT



If they are not the same then adjustment is required to balance the readings. This is done by loosening the lock nut between the two throttle bodies and adjusting the screw (*which actually looks like a small threaded bar with an Allan key socket in the top*) until the two are the same. Of course if you adjust the amount of air that is passing through a throttle body this will have an effect on the speed of the engine, which in turn will affect the amount of air being drawn through the throttle bodies and therefore the readings. So what actually has to be done is make an adjustment, then check both the bodies that are linked by the linkage, then make another small adjustment, then check etc. Between each adjustment and check it is imperative that the lock nut is done back up again as this can make enough difference to alter the readings.

What I did was adjust as just described then go back along the chain of all of the throttle bodies and check them all again, before moving onto the next, slowly working away from the middle. This is not a particularly difficult job but it is one that requires patience. The reason that I mentioned earlier in this that the engine did not need to be up to temperature is that during the process I go back and forwards re-checking all the time, therefore checking everything at the same temperature. By the time that I finish it is fully up to temperature which gives an indication of how long it normally takes me, either that or I am just very fussy in getting them all as close as possible.

Once this has all been done, I check, and if necessary adjust, the tick-over speed. This is done with a similar looking adjuster in the centre at the back, almost under the fuel rail. Finally I reset the throttle sensors using the MBE Tool (*downloadable from [www.mytscan.co.uk](http://www.mytscan.co.uk) although you do need the correct cable to connect*) so that the ECU knows where the throttle butterflies are at tick-over. I also reset the adaptive maps as well.

Before finally putting it all back together I check the 'O' rings that seal the air-box to the throttle bodies and replace any that are of dubious quality. It is then just a case of putting the top of the air-box back on, which is a gentle wiggle, remembering the small pipe at the back as it all has to come out again if this one is forgotten. Also when putting this back make sure that the two outer clips are in the correct position, as if not there is not enough room to manoeuvre them once the air-box cover is in place. I have found that it is easiest to do up the clip that is on the back of the air-box first, followed by the other two clips and finally the two bolts that go into the throttle bodies. Replace the bonnet and take for a test drive, whilst revelling in another well done job!

**Mike Hardy**

