



## Adjusting A Series Valve Clearances

### Overview:

Making sure that the valve clearances are set correctly will maximise starting efficiency, performance and engine life. Since the almost universal adoption of unleaded fuel the figures given in most manuals for the valve clearances are too tight and you should use the clearances outlined below. Even more important is to use the correct method. The method outlined in some places for checking and adjusting the clearances is that which would be used in 'normal' cars – to ensure a long engine life please adjust the valves ONLY using the process outlined below.

As the rocker covers need to be removed in order to adjust the valve clearances it makes sense to carry out this task when you are changing the oil. I recommend that you check the valves every time you service the car – it only takes a few minutes, makes a considerable difference to the running of the vehicle and gives a good indication of the condition of the valve seats.

### Tools Required\*

- Spanner or socket for removing the triangular wing panels - 8mm
- Spanner or socket for removing the wing bolts - 19mm
- Spanner or socket for removing the rocker covers – 12mm
- Spanner or socket for valve gear retaining nuts – 10mm
- Thin wall socket suitable for undoing fan bolt (14mm) inc. bar and ratchet.
- Plain screwdriver for adjusting valve clearance.
- Set of feeler gauges

### Materials Required\*

- Approximately 0.33 litres of fresh oil.
- New rocker cover gaskets (2).

**\*If carrying out along with an oil change additional tools and materials are required.**

### Step 1 - Preparation

1. Read the instructions from start to finish.
2. Make sure you have the necessary tools and parts to hand.
3. Park the vehicle on a level surface and switch the ignition off.
4. Remove the triangular panels (2CV) between the front wings and the bonnet on both sides of the vehicle (3 x 8mm bolts). Look out for any earth wires for the front indicators that may be installed and remember how they are connected.
5. Remove the front wings (2CV - 4 x 19mm nuts each side). Again, look out for any earth wires that may be present for the indicators.
6. The rocker covers are located at the ends of the cylinders sticking out of each side of the engine, a single 12mm nut holds them on. Place a drip tray under the rocker covers to catch the old oil (an old paint roller tray is ideal for this), undo the nut and remove each cover. A slight tap with a rubber mallet or wooden block may be required to free it.

## Step 2 – Checking the clearances and completing the job.

1. After completing step 1. clean the old gasket off the inside face of each cover using a scraper or sharp knife and make sure the face of the cover is perfectly clean.
2. Using contact adhesive apply some to the face of each rocker cover and to one side of the new rubber rocker cover gaskets. Lay the parts to one side to tack up.
3. Make sure the engine is cool (not Fonzie cool, temperature cool).
4. If you know what the bits look like then ignore this bit and go directly to 8., otherwise its time for a bit of familiarisation; Get down on one side and have a good look at the mechanism you exposed when you removed the rocker cover. You are looking at the top of the vehicles cylinder head.
  - (a) Immediately to the left and right of the rod that has the thread for the rocker cover nut you will see the rocker arms. These are orientated vertically and each one has two small actuating arms extending out left and right.
  - (b) If you look at the actuating arms closest to the center of the head you will see that it connects to a rod: this is the pushrod that activates the valve and is driven from the vehicle's camshaft located in the bowels of the engine.
  - (c) The other actuating arm faces the outside of the cylinder head and this is the one that operates the valves.
  - (d) The valves themselves are located under the outer small arms and if you look carefully you will see a strong spring on each one. The small arm acts on the stem of the valve and pushes the head into the engine. The spring closes the valve again and seals the head against the valve seat. The valves at the front of the engine are the exhaust valves and the ones at the rear are the inlets.
5. Insert your 14mm socket on a long breaker bar into the hole in the center of the engine cooling fan. It doesn't matter which way you rotate the engine, but I always go clockwise (equivalent to 'do up' on the ratchet).
6. Standing in front of the vehicle rotate the engine using your ratchet and as you turn have a look at the cylinder heads on each side. The pushrods act on one end of the rocker arms and as they move in and out the other end opens and closes the valve.
7. The valves are open when the rocker arm forces the actuating arm onto the top of the valve, compressing the spring, and forcing the head of the valve into the cylinder. The valves are fully closed when the head is as far away from the cylinder as it can get. At this point there should be a small gap between the head of the valve stem and the small arm that pushes against it. This is what you want to measure and adjust.
8. It doesn't matter in which order you check the valves but the method used is very important. I like to start with the inlets and progress to the exhaust personally.
9. Standing in front of the engine slowly rotate using your ratchet whilst carefully watching the inlet valve (the one at the back) on one side. What you are looking for is the point where the valve is pushed furthest into the cylinder head (fully open). No real knack to this, just patience and care. What I do is to rotate until the valve goes in and **just** starts to come back out again, simply reverse the ratchet and turn it back a bit – keep going back and forward until you are satisfied that you have the valve fully open. Once it is, remove the ratchet from the fan.
10. Get your feeler gauges out and select 8 thou (imperial) or 0.20mm (metric) for the inlets.
11. Now the important bit; go round to the other side of the engine and measure the gap on the inlet valve on the **other** side. See Appendix A for a bit more detail.

12. To Measure the gap put your screwdriver on the slot that is on the actuating arm pushed by the pushrod (not hard, just enough to make sure that the arm is located fully on the pushrod) and slip your feeler gauge between the actuating arm on the other side of the rocker arm and the end of the valve stem (immediately above the spring).
13. Your feeler gauge should be a nice fit and should **just slip nicely** between the two parts – the idea is that it should be slightly dragging on both parts. Very hard to explain but you will know exactly what I mean when you get the clearance right.
14. If the feeler slaps about in there (or more likely) won't go in then you need to adjust the clearance.
15. This is achieved by slackening the 10mm nut that is under the screwdriver slot you had your screwdriver in and turning your screwdriver in or out to adjust the clearance. Unscrew increases the gap and vice-versa.
16. Once you slacken off the adjusting nut, leave your spanner on there and insert your screwdriver through it to the slot. This is necessary because you will need to use the screwdriver to 'hold' the adjustment whilst you do up the nut again.
17. Once you have adjusted the gap and retightened the nut check the gap again. Too tight eh? – this is because the screw tightened slightly as you did the nut up. Either hold the screwdriver tighter or set the gap a little slack so that it does up to the desired value.
18. If you are of the "a slappy tappet is a happy tappet" persuasion the gap can be increased to 10thou or 0.25mm for the inlets. I favour a 'slack' 0.20mm myself
19. This is a lot harder to describe than to do – its pretty easy actually. With the first one done go back to the front of the engine and use your ratchet to rotate the engine so that the inlet valve you just adjusted is fully open and adjust the inlet on the other side using the same process.
20. Once the inlets are done rotate the engine and check them both again. Re-adjust if necessary.
21. Half way there so lets attend ourselves to the exhaust valves which are adjusted exactly the same way (fully open one valve and adjust the corresponding valve on the other head) but with bigger gaps. The exhausts should be set at 10 thou or 0.25 with a maximum of 12 thou or 0.30mm. I like a slack 0.25mm myself. Job done.
22. The adhesive will have dried on the gaskets and rocker covers by now so stick the gaskets to the covers and place them back on the heads.
23. The nuts that hold them on can be a little difficult to thread correct and if one doesn't work simply try the other one. They should be torqued up to 4-6 ft/lb which is hardly more than hand tight.
24. Refill the engine with suitable oil to the max mark.

### **Step 3 –Completing the job.**

1. Disconnect the + coil terminal and turn the engine over a few times – the oil pressure light should go out while you are cranking over. This allows the oil pump to fill the rocker covers.
2. Check and top up the oil level again.
3. Start the engine and let it run for about 30 seconds. Leave for a few minutes and then check and top up the oil level again.
4. This is a great opportunity to clean all that old oil from the engine and bay. A power washer is ideal – if you don't have one borrow one from the neighbours. If there is lots of it caked on you might have to apply some degreaser to loosen it off. If you leave it all in there it will be much more difficult to spot any leaks.
5. Start the car and let it run for a while to warm up. Constantly check very carefully for any oil leakage around the valve covers. You should also look around the filter, pushrod tube seals, sump pug etc. If there are any leaks rectify NOW.
6. If there are no leaks build up the bodywork again and have a well earned cuppa.

### **Appendix A**

#### **Method**

It is more normal to adjust valve clearance by having the valve fully closed and then measuring the clearance at that valve. If you do this on an A-Series engine this will result in valve clearances that are very (very) tight. You must not use this method – always fully open one valve and adjust the corresponding valve on the opposite side. You have been warned.

#### **\* Important Note**

Old oil is dangerous stuff and can cause irritation to the skin. Wear gloves, or at least make sure it does not get on your skin. Always dispose of it in a responsible manner as it is highly dangerous to the environment. Most Local Councils have a purpose designed disposal site at their recycling (skip) centres. Be responsible, USE THEM.

#### **Unleaded Fuel/Valve Seat Regression**

The increased clearances over those specified in the manuals are necessary for use with unleaded fuel. The increase in the exhaust valve gap, in particular, aids cooling. The job is pretty easy to do and I recommend that the gaps are checked every 6,000 miles as a minimum and every 3,000 for preference. If you notice that you need to adjust the gaps every time then your engine could be suffering from valve seat regression.

#### **Late Cars - Pushrods**

Some very late (F & G Reg.) cars can suffer from the gaps increasing (I believe) because the balls at the end of the pushrods start to unscrew. I have never seen this myself and don't know what one would do about it apart from replacing the pushrods.

#### **Why do it?**

The valve clearances are something that the A Series engine seems particularly sensitive to and (particularly when they get tight) starting and performance suffers.