# Triple Echo


April/May

179

TR30C

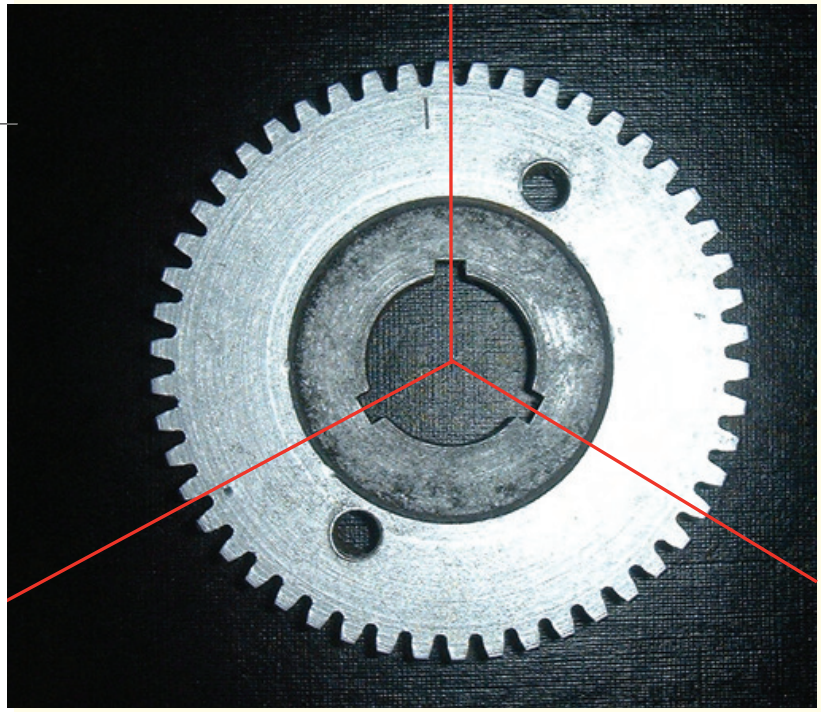
The Magazine of The Trident & Rocket Three Owners Club

# Triple cam timing

Pete Churchill

I went on a management course once, it didn't do much good and I work for myself now! I did however learn one thing and that is; if you want to get a message across, you tell 'em what you are going to tell 'em, tell 'em, then tell 'em what you've told 'em! It appears to work so I'm going to try it with cam timing.

In the simplest terms, you measure the valve lift at top dead centre. If it is not somewhere close to 150thou then you remove the cam wheel for the cam you are working on and replace it in the position that gives you the figure closest to that.



Somewhere around here Dave will have inserted a photo of a cam wheel that has been divided into three to illustrate the different positions. If you look along the lines through the centre of the keyways out to the teeth you will see that the lines cut through the teeth in different places. This is how we adjust the valve lift.

Following is an article which goes into greater detail and following that is a Haynes manual type words and pictures from Richard Darby who just happened to be rebuilding John Young's engine, so many thanks to him for that and to John for providing the engine!
Richard does use a dial gauge to find TDC whereas I prefer a degree disc however the theory remains the same that the most accurate postioning of TDC is half way between the same measured distance down the bore before and after TDC. The big advantage of Richards method is that you can check the timing without removing the timing cover!
You just establish TDC then measure the valve lift.

And so on to a more detailed description.

# Timing Triple Cams.

## Why?

We know that some Triples are fast and some not so, I am talking about standard ones here but the following still applies. If you fit some cams made by a manufacturer other than BSA or Triumph, then you must follow their settings. By 'fast' I mean responsive, crisp and sounding right!

Ignition timing and carburation obviously play major parts in this but I am assuming you have the latest in electronic ignition or set your points up perfectly and that your carbs are spot on and therefore are looking to your cams for that bit extra. It is part of Triumph lore now that the T160 was detuned slightly to ***assist with emission controls in the USA*** and this was done by retarding the ***inlet*** cam slightly. Well I can vouch for the fact that my brother's T160 was a lot slower than my T150, which peed him off no end because I had bought the 150 from him! But that was in '76 '77 when we didn't play around with the engines too much and just rode what we had. Also we used them to get to work so couldn't afford for them to be off road for any reason.

These days though we have the time and knowledge to make them work as they should do.
My problem is to try to explain the job in terms that don't send you to sleep yet make you realise that it is within your mechanical skills.

*It is possible to check the openings without disturbing the timing cover and ignition. However, in order to adjust the cam timing, it should be noted that the timing cover and therefore ignition as well, will have to be removed.*
*First of all, let's see what you will require in terms of tools and equipment.*

*Two dial gauges, at least one of which must be imperial. This one is to measure the amount that a valve is open, the second is for finding Top Dead Centre (TDC).*
*A bracket to mount one dial gauge (imperial) off the extended head bolt so that the plunger can be mounted to sit in line with the valve stem on the flat part of the valve collar. If necessary, an extension to the plunger must be used.*
*A bracket, or a plug TDC tool, to mount the second dial gauge onto the piston. Again, if necessary, an extension to the plunger must be used.*
*The correct cam pinion removal tool for your engine.*

## Preferred Method

I am only going to describe one method here to keep things simple. There are a couple of ways but I find this the easiest and it was the preferred method in the competition department of Meriden and other well known Triumph tuners. It is the

'valve lift at TDC method'.

## Finding TDC

The most accurate way of finding Top Dead Centre is not to go looking for it!

By this I mean that if you put a dial gauge on top of the piston and a degree disc on the crank; when you are closest to TDC the dial gauge will not move, or move infinitesimally *(I used spellcheck for that one!)* for quite a large movement in the degree disc. So what we do is wind the crank backwards before TDC until the dial gauge reads 20 thou, 25 thou, anything, it doesn't matter; read off the degrees on the degree disc. Then wind the crank forwards beyond TDC until the dial gauge reads exactly the same as the figure you chose before, then read off the figure on the degree disc. TDC is exactly half way between the 2 figures you read on your degree disc.

To clarify that point if your degree disc pointed at zero, one inch before TDC, then ninety, one inch after, TDC will be at forty-five.

Now when you move the crank to TDC you can 'zero' your degree disc; in my example, move the crank to forty-five then without moving the crank, move the disc to zero. Then check your efforts by going through the process again!

If you didn't follow that bit then pack your tools away and go for a ride instead. Then save up to pay someone else to do it!

## Set-up

Firstly, set your valve clearances to zero on number 1 *or timing side* cylinder. *It is preferable to remove the locknuts as well – this makes it easier to locate the dial gauge plunger onto the valve spring collar. Then rotate the motor until all the standard marks on the pinions line up correctly (it's just easier to start from this point).*

At this moment, because it is important not to move the engine accidentally when working on it, you can slacken the camshaft retaining nuts so that they are easier to remove should you need to do so.

*If you have a spare or old crankshaft timing pinion, this can be used between the intermediate and camshaft pinions to lock them up.*

*Now rotate the engine forward until you find approx TDC on the TS cylinder, when the exhaust valve is just closing and the inlet valve is just opening. Now you can fit your dial gauge to locate accurately TDC, as described above.*

Next you need to fix your imperial (not metric) dial gauge, over the ***inlet valve,*** so that the pointer moves freely in exactly the same direction as the valve, the easiest place to measure from is the flat part of the spring collar. Take some time over this and ensure that the gauge is zeroed and that the needle is does not skid about on the valve spring collar.

When you are happy with this rotate your engine *backwards (anti clockwise), until the valve is closed. You can now read off the figure on the dial gauge which will tell you by how much the valve was open. The figure that we are looking for is between 0.140"-0.150". If it is less than 0.136"* then Triumph designed in some adjustment in the form of 3 keyway positions. This means that each keyway is 1/3rd of a tooth different. *Return the motor to the point where all the marks line up, count 17 teeth*

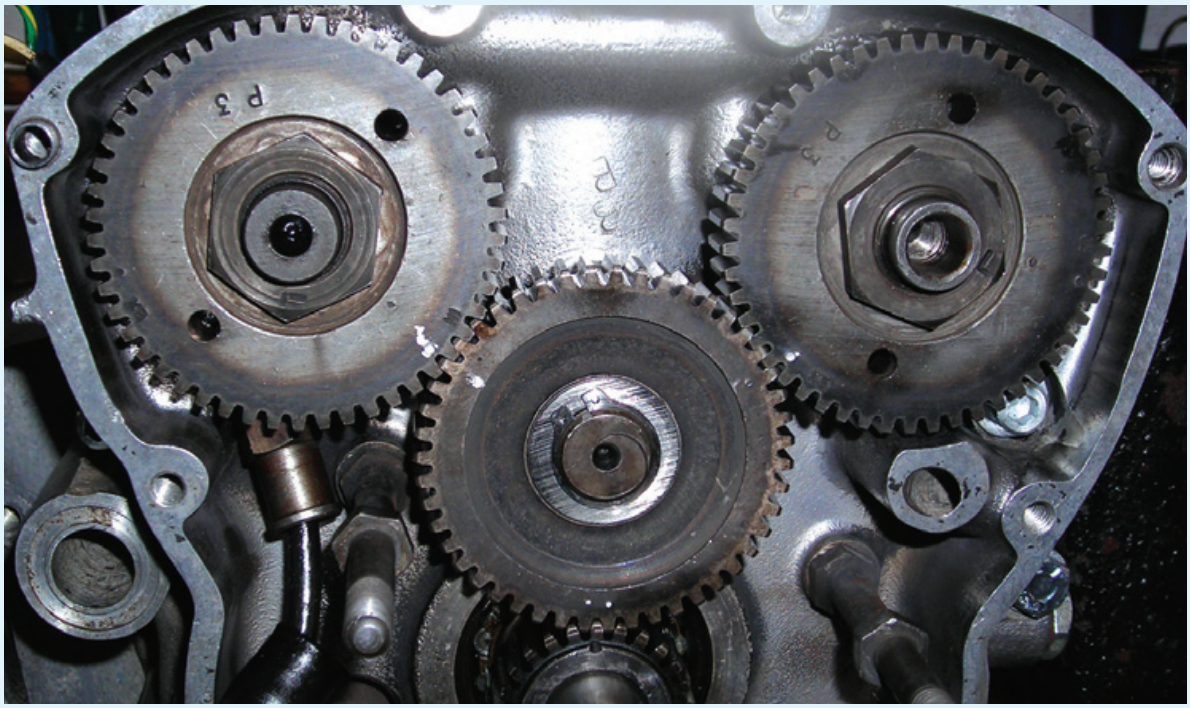
*anti clockwise on your cam pinion and mark the new position (Tippex is good).*
Carefully remove the cam wheel and replace it using the keyway that is closest to the new mark and recheck.
*If necessary, re-adjust by again counting 17 teeth ant-clockwise, remove and refit the pinion.*
You may not achieve exactly this figure and if you can't you should aim for a lower figure than 0.150" to be on the safe side.
*A rough calculation of 0.018" for each 1/3 tooth can be used to add to your original measure to give an idea of by how much to adjust the pinion. Should you wish, you can centre punch a mark on the pinion for future reference.*
All you have to do now is the same on the exhaust side but this time wind the engine *forwards or clockwise.* After tightening up the cam wheel nuts, double check both valves then reset the valve clearances to 8 and 10 thou, yes I know the manual says 6 and 8 but it should be well known by now that 8 and 10 are the preferred settings –

*Doug Hele told us so in one of his memos!*

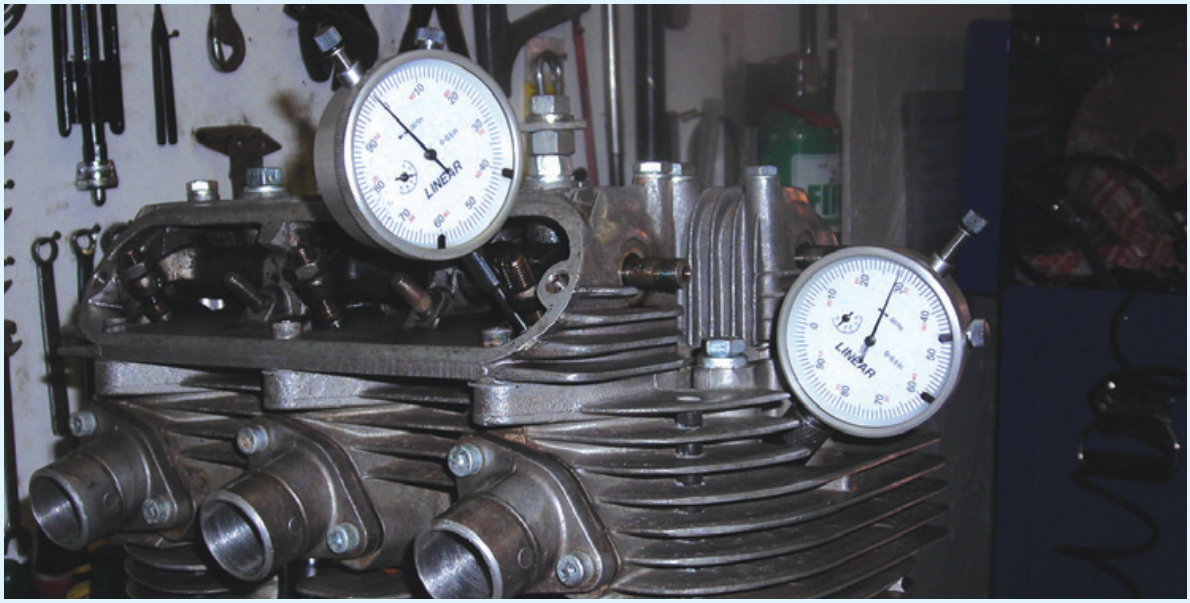
## Conclusion

When you start your engine the first time after doing this, you should hear a deeper, crisper exhaust note, then you will feel the bike pulling harder with a greater willingness to rev, there are NO tradeoffs! It goes without saying that the bike will be quicker but it also means that you can easily pull a higher gear and achieve greater fuel economy: my old bike had a 19 tooth front and 46 back sprocket, would cruise all day at 80/85mph (and often did) yet return 50mpg.
This job is not hard but takes time; the dots are for economic assembly on the production line but best performance is achieved with a bit more effort. If when attempting this you are unsure of something, give me a ring and I will try to help out:
I made a couple of phone calls the first time I tried it and must have checked a dozen times before I dared start the bike!

*Much of this information can also be found in the excellent article on rebuilding a Triple motor by the late Jack Shemans, which appeared in "Classic Mechanics", April/May 1986.*



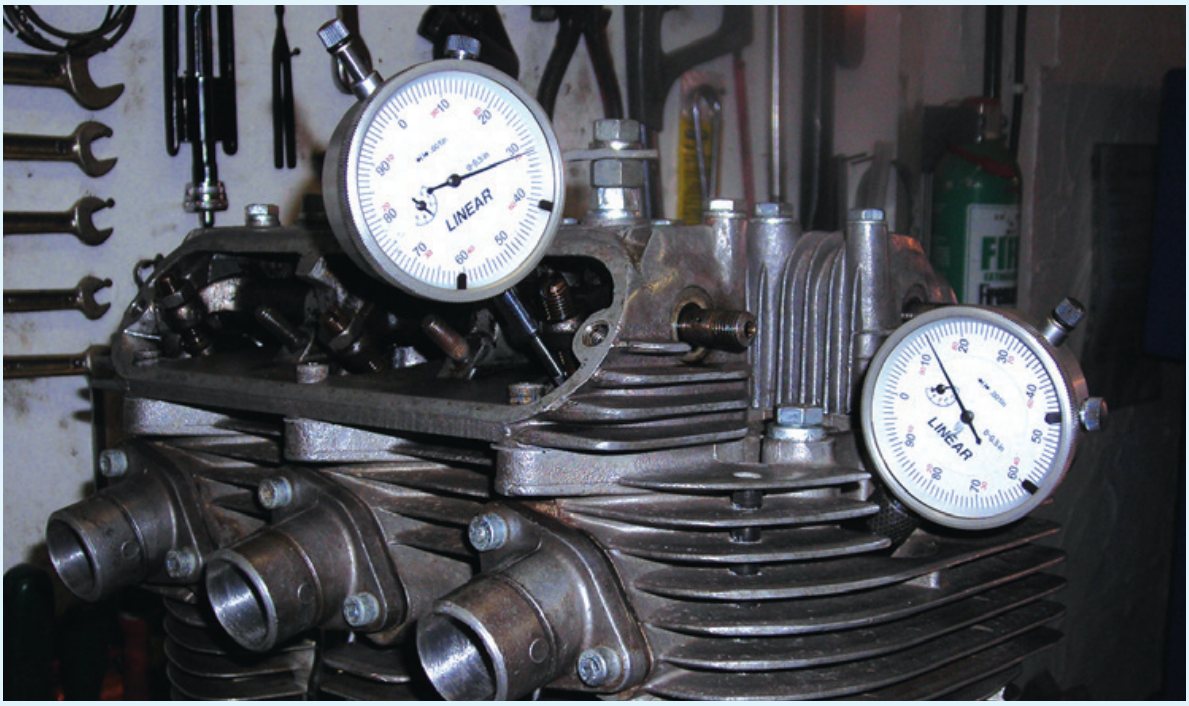
## Picture 1




## Picture 2

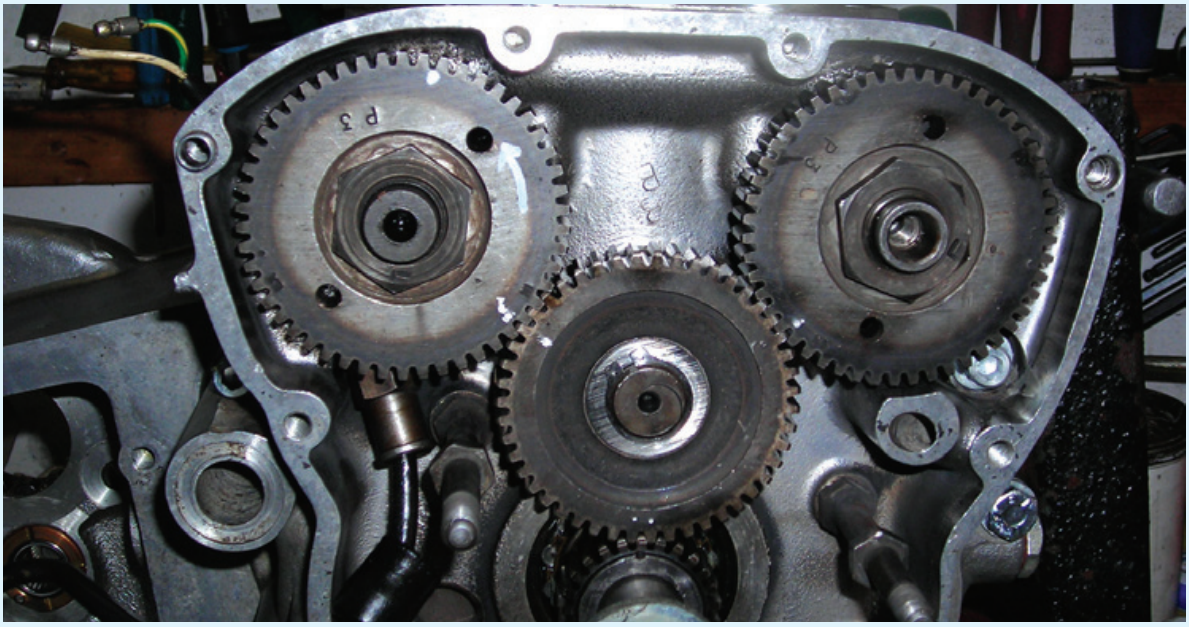
Shows first dial gauge set up on piston to find TDC, with both valves on the overlap. This does not need to be zeroed.

The second dial gauge has been set up with the tip of its plunger set onto the "flat" of the valve retaining collar, as close to and in line with the valve stem. This has been zeroed so that when the motor is rotated in reverse direction (for the inlet cam) and the valve




## Picture 3

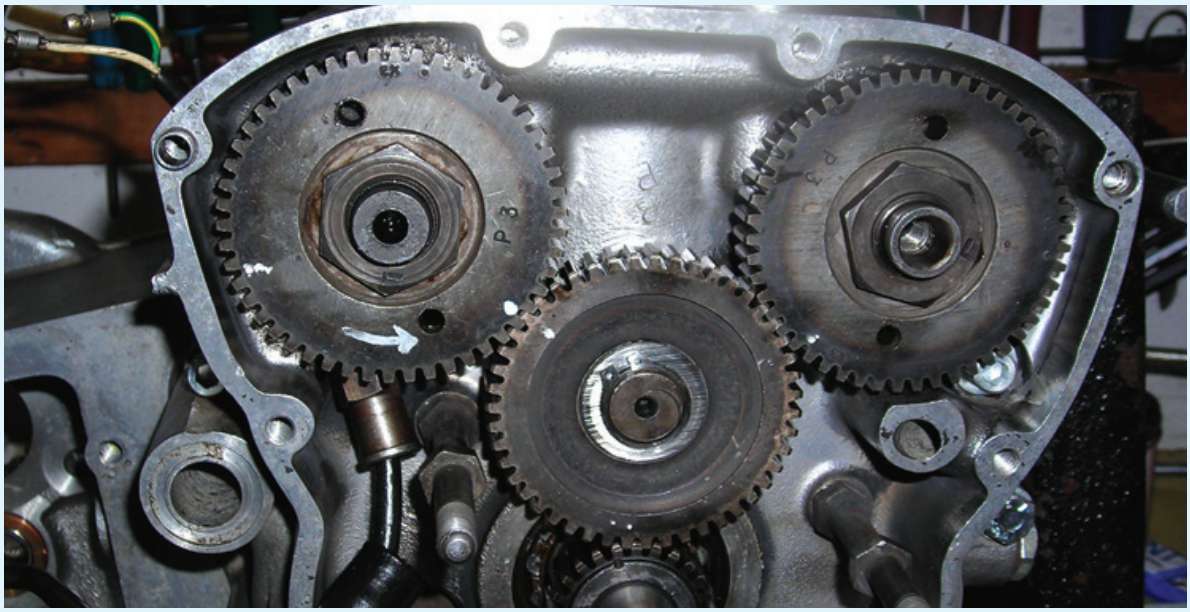
Looking at dial gauge two (on the valve collar) we can see that now that the valve is closed, the amount it was open was 0.132". We are looking for as close to 0.150" as being the optimum. For a rough calculation we add 0.018" for altering the timing by 1/3 tooth



which will give us 0.150". We now know by how much to adjust the cam pinion.

## Picture 4

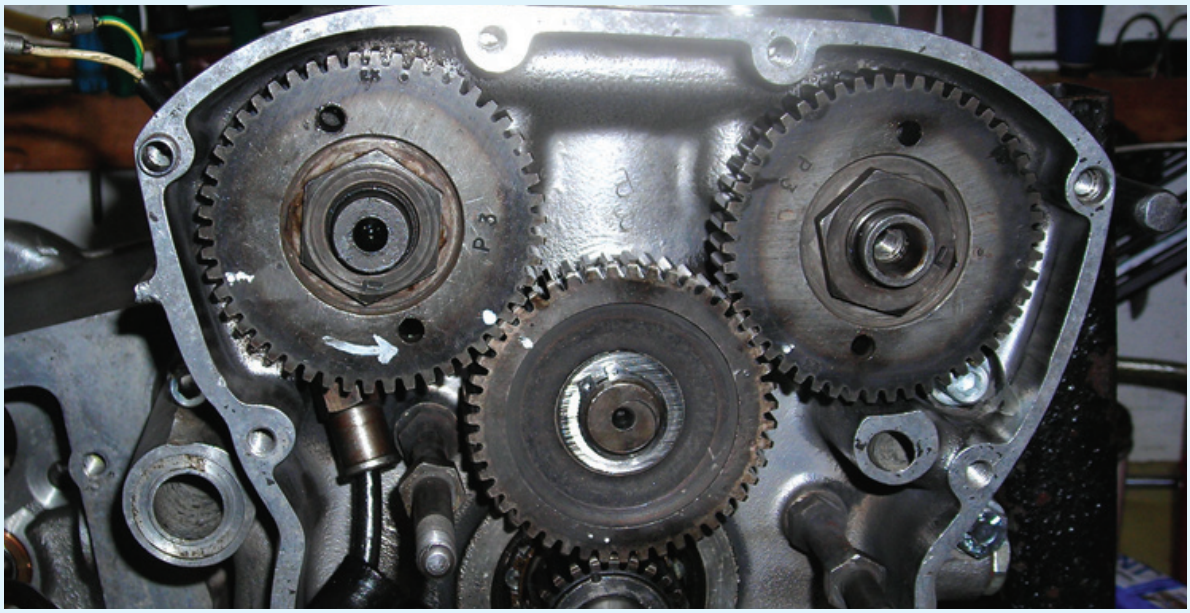
Rotate the motor forwards again until the std marks are again in alignment. Now count



17 teeth **anti-clockwise** and mark that position.

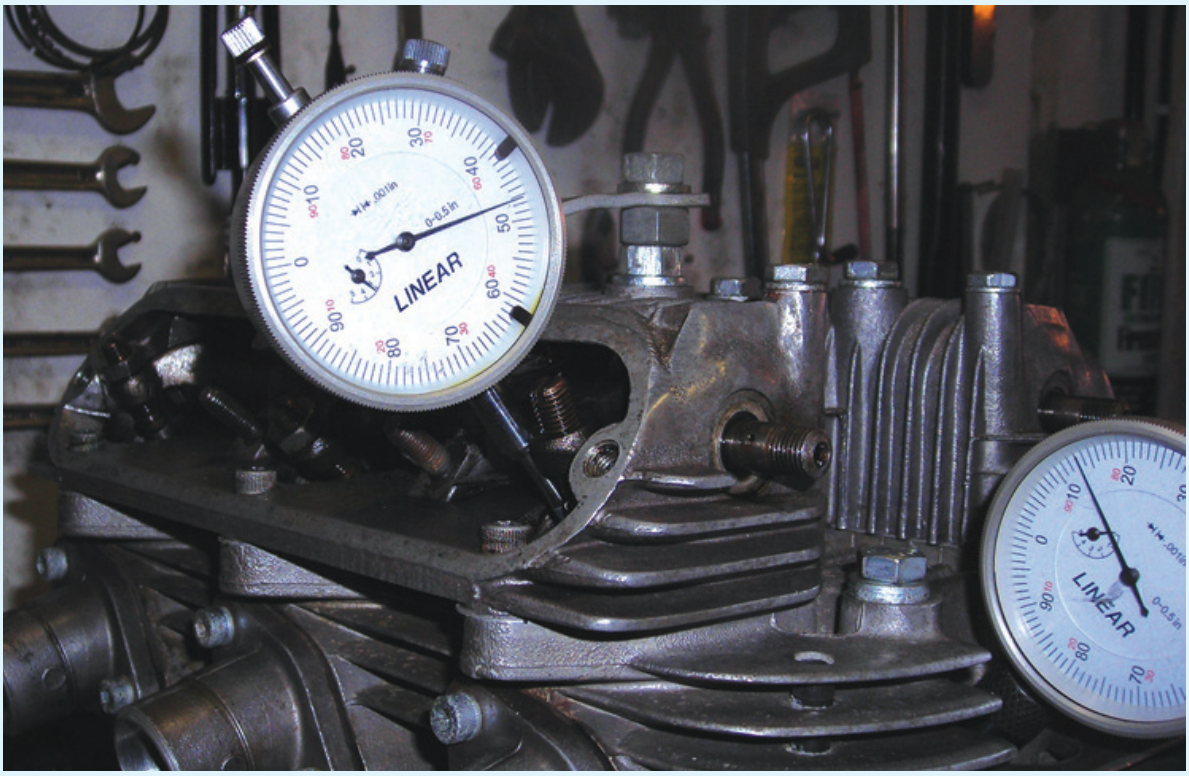
## Picture 5

Now remove the cam pinion from the cam using the appropriate extractor and refit it to the cam so that the "new" mark on the cam pinion aligns with the std mark on the intermediate pinion. In order to do this, it means that a different keyway (nearest to the



new mark) on the pinion is used – the cam remains static. It may be necessary to turn the crank slightly whilst fitting the pinion to allow the keyway to be lined up correctly with its camshaft key.

## Picture 6




TDC with both valves open is again located and the dial gauge on the cam reset to zero.

## Picture 7

The motor is again rotated in **anti-clockwise** direction (for inlet cam) until the valve closes. The reading we now have on this motor is 0.148" – absolutely perfect.

The same exercise can now be carried out on the exhaust cam, only remember, this time we are going to rotate the motor **clockwise** in order to close the valve. If it is required to increase the valve opening, you must also count 17 teeth **clockwise** for each 1/3 tooth. On this motor in the example, the exhaust cam was spot on at 0.150".

For road machines, checking on one cylinder only is sufficient. For competition motors using high lift cams and high domed pistons, valve to piston clearance must be checked on all cylinders as must cam timing be checked on all cylinders.