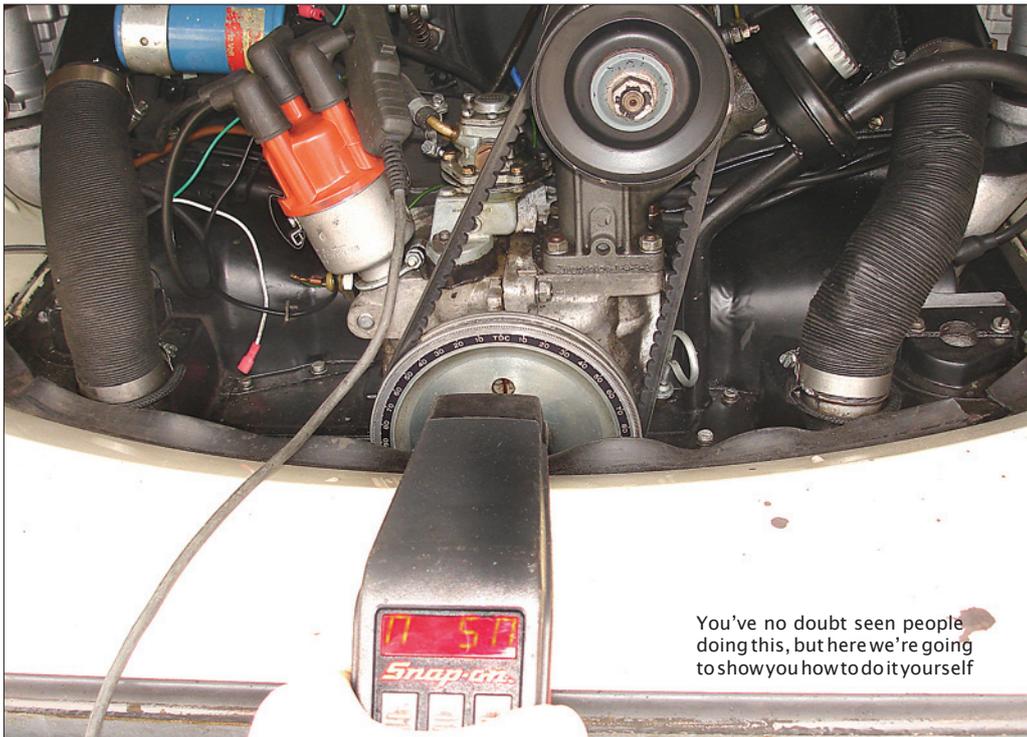


# Setting ignition timing

CHECKING AND ADJUSTING your ignition timing is not as difficult as you might think, especially when armed with this handy guide...



You've no doubt seen people doing this, but here we're going to show you how to do it yourself

Ignition timing is somewhat of a tricky subject, not because the act of checking ignition is difficult, but rather because there are just so many variables. To start with, VW and Bosch produced more than 100 distributors for the Beetle engine over the years, so the chances of having the correct one in your engine aren't great. Also, there are many different bottom pulley markings and most are interchangeable. Fear not though, because armed with this feature you will be one step closer to unravelling the mystery.

First though, what actually is ignition timing? Put simply, it's the point at which the spark plug fires in relation to the piston's position in the bore. You may have seen the abbreviations BTDC and ATDC

and wonder what on earth they mean. BTDC means Before Top Dead Centre and ATDC means After Top Dead Centre. So 10 degrees BTDC refers to the spark plug firing 10 degrees before the piston reaches the top of its stroke and 10 ATDC would mean the sparking plug would fire 10 degrees after the piston had passed TDC (Top Dead Centre). Got it? Good.

*with this guide you'll have a good starting point*

This feature is designed to get you thinking about the correct timing figures for your engine and finding the correct markings on your pulley. I make no bones about the fact that you will have to do some work to find out exactly what engine you have, but this will give you a good starting point.

Before checking the ignition timing on any engine with contact breaker points you must check the points gap is correct (see page 24 for how to do this). The reason for this is that the points gap directly affects the ignition timing, which is one reason why electronic ignition modules make good sense as the relationship between electronic ignition and ignition timing remains constant, whereas with points gaps it changes with time and wear.

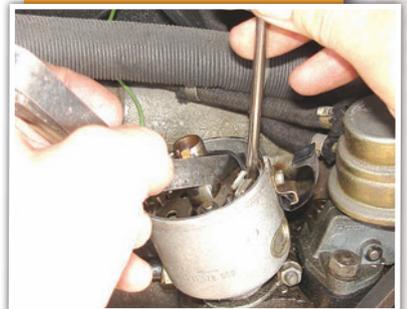
Bottom pulley markings are there to signify TDC and ignition timing points. If your engine is completely stock and original to the car then they're probably correct, provided the distributor is as well of course. If not, you need to check exactly what you've got, but no longer will there be an excuse for your engine timing to be out.

**COST:**  
From £30 for a stroboscopic timing light

**TIME TAKEN:**  
1/2 an hour

**DIFFICULTY:**  
✂ ✂ ✂ ✂ ✂

**TOOLS USED:**  
screwdriver, 10mm socket and extension, feeler gauge, strobe light



To check ignition timing thoroughly you will first need to check your points, tappets and plugs. Get all this right before you start on the timing



If you're unsure which mark denotes TDC on your crank pulley, use a set square and mark it at 90 degrees to the woodruff keyway (arrowed) as shown

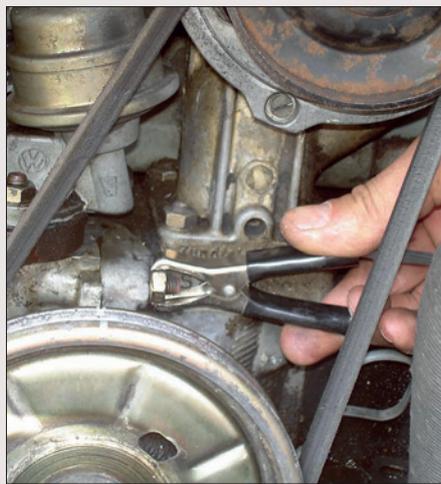


This is a snazzy stroboscopic timing light, but they're available from as little as £30. Just make sure it has advance and retard and reads revs though, okay?



**01** Over the years Volkswagen used a bewildering array of distributors on its air-cooled engines (check out the oddity above), so a definitive list of timing figures would be very long indeed! For a complete list of ignition timing figures, and a superb cross reference of distributors used, point your browser to: [www.oldvolkshome.com/ignition.htm#A5560](http://www.oldvolkshome.com/ignition.htm#A5560) where you will be able to check that your engine has the correct distributor fitted and exactly what the ignition timing figures should be, given the engine and distributor combination. In the meantime, below is a list of the most common air-cooled VWs to get you started

**02** Adjusting your timing is pretty simple, but first you need to ascertain whether your bottom pulley has the right timing mark notches for your engine. If you're in any doubt, undo the crank pulley nut and remove the bottom pulley, then check the TDC mark with an engineer's set square as shown on the opposite page. The woodruff keyway is at exactly 90 degrees to the TDC mark, so this will tell you which of the markings on your pulley signifies TDC. If there are no notches, make one or mark TDC in white paint so you have an easy reference point when you fire your ignition timing light



**03** There are three connections on a timing light. The inductive clamp goes on the no. 1 cylinder ignition lead (that's the back, right hand one)

**04** You'll need a good earth and one of the case half nuts is ideal, but make sure the connecting wire doesn't get caught in the fan belt!

**05** Finally, connect the red lead to a 12v source. On some VWs you can go direct to the battery, if not use the positive terminal on the coil

ENGINE

## Ignition timing figures

### Beetle

1961-1964 1200	10deg BTDC @ 800-950rpm*
1965 1200	10deg BTDC @ 800-950rpm*
1966-1967 1300/1500	7.5deg BTDC @ 800-950rpm
1968 1500	0deg TDC @ 800-950rpm*
1969-1970 1500/1600	0deg TDC @ 800-950rpm*
1970 1600	0deg TDC @ 800-950rpm*
1971 1600	5deg ATDC @ 800-950rpm**
1972-1973 1600	5deg ATDC @ 800-950rpm**
1974 1600 distributor type:	
VW 043-905-205C, 0231 176 028	5deg ATDC @ 800-950rpm**
1974 1600 distributor type:	
VW 043-905-205, Bosch 0231 170 034	7.5deg BTDC @ 800-950rpm*
1975-1979 1600 fuel injection	5deg ATDC @ 800-950rpm**

### Bus

1960-1963 1200	10deg BTDC @ 800-950rpm*
1964-1965 1500	10deg BTDC @ 800-950rpm*
1966-1967 1500	7.5deg BTDC @ 800-950rpm*
1968 1600	0deg TDC @ 800-950rpm*
1969-1970 1600	0deg TDC @ 800-950rpm*
1971 onwards 1600	5deg ATDC @ 800-950rpm**

\* with vacuum hose disconnected and plugged  
 \*\* with vacuum hose connected

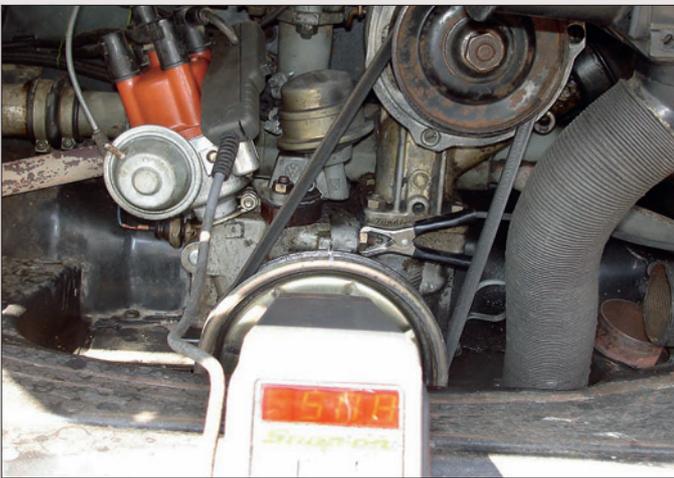
**faq**

Q: How do I know if my engine is the original one?

A: There's no way of telling for sure, but the number under the generator stand will date it

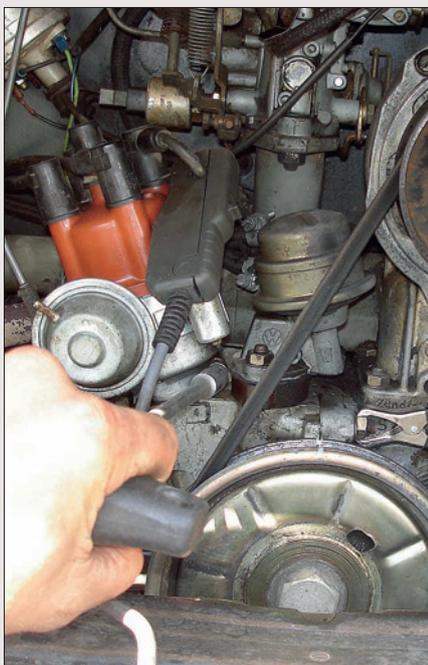


**06** Okay, let's say your engine requires the ignition timing to be set at 10 degrees BTDC at 800-950rpm with the vacuum hose disconnected and plugged. Simply pull off the vacuum hose from the distributor as shown and plug it to stop air leaking into the carburettor. Then set your timing light to 10 degrees of advance (remember BTDC = advanced timing)

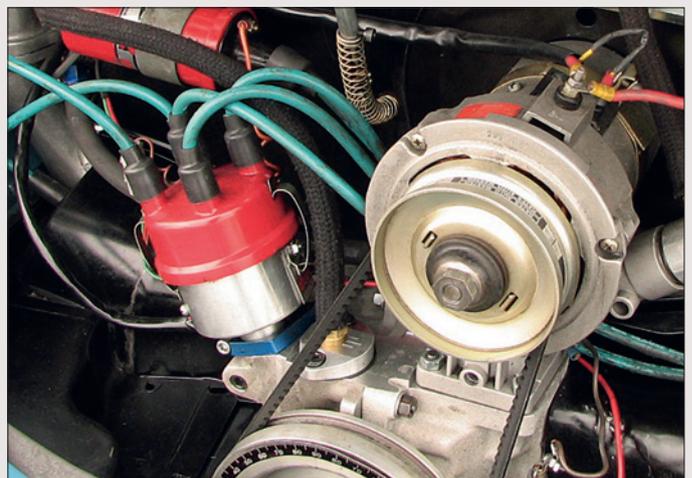


**07** With a stock distributor, timing should always be set with the engine running between 800 and 950rpm (as indicated either on your timing light or by a rev counter). Hold your timing light so its beam fires light on to the bottom pulley and engine case centreline. If the timing is correct, the TDC mark on the pulley will line up directly with the crankcase centre line. If it does not, you have to adjust the distributor, so go to the next step

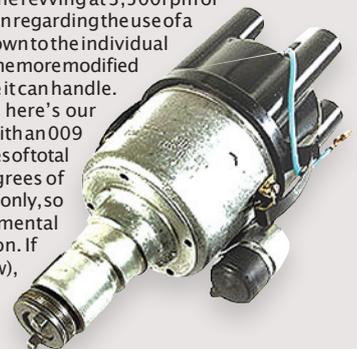
**08** To adjust the ignition timing you need to rotate the distributor. To do this, loosen the 10mm nut on the distributor clamp just enough that the distributor can be rotated by hand with a little effort



**09** Unless your engine is way out, adjustments are normally made by minute turns of the distributor, so gently. Turning the distributor clockwise will retard ignition timing and anti-clockwise will advance it. Do this as you're firing the strobe and when your marks line up, re-tighten the clamp and then check it again. Happy? Job done! See, it wasn't that bad



**10** Now that you've got your head round that, we'll confuse you by saying that if you've got a Bosch 009, or pretty much any other type of aftermarket non-vacuum advance distributor, then it needs to be timed slightly differently. This is because they use a centrifugal advance mechanism, which means that as rpms rise so does the ignition advance curve. Generally, all of the ignition advance is in by 3,500rpm so the ignition timing needs to be measured at maximum advance i.e. with the engine revving at 3,500rpm or above. As VW never supplied information regarding the use of a 009 or the like, specific timing will be down to the individual engine's needs but, basically speaking, the more modified the engine is the more ignition advance it can handle. That won't really help you though, so here's our man Keeno's tips for timing an engine with an 009 dizzy - stock(-ish) engine: 27 - 29 degrees of total advance; modified engine: 30 - 32 degrees of total advance. These are ballpark figures only, so it is up to you to check for signs of detrimental running i.e. 'pinking' or pre-detonation. If either condition exists (see panel below), the ignition advance must be backed down immediately, otherwise damage to your engine will occur



### Not so cool running

There are a multitude of aural signs that your engine isn't running right but it takes a trained ear to hear and to understand them all and they're almost impossible to explain in words. However, 'pinking' and pre-detonation as mentioned here we'll try to explain. Detonation is where the fuel/air mix doesn't ignite and burn but explodes instead, which causes a dull thudding sound and, in extreme cases, a vibration that you can feel through the chassis. Pinking is usually caused by a hot spot in the combustion chamber causing the fuel to ignite before the spark plug sparks it. This will give a more metallic sound, like nuts and bolts being rattled in a tin can. Get your timing right, your carb adjusted correctly and do all the other basic engine maintenance procedures covered in this manual and you shouldn't have either of these.