Setting the timing on the kit.

By RD Chinoy

Introduction:

This memo is mainly meant for people who have ordered kits after 10/1/2001. You will notice that all kits going out after this date will have a slot on the coil plate for adjusting the timing. Customers who ordered before this date received a coil plate with a drilled hole. I.e. it was not possible to change the position of the coil plate. The timing was pre-set at 2mm BTDC. Upon request from customers we are now providing slots on the coil plate that allow you to set the timing. Due to the fact that the kit is being used on so many diffirent RD models we highly recommend that you check the timing at least once when installing the kit. Customers of the older kit can change the hole into a slot with a hand file or drill gun. If you don't like the slot we have given you can have it filled with brass at any Gas Welding shop and drill new slots in. That's the beauty of working with Brass. Also the slot we have made has been made small so that no matter how somebody installs the kit the bike will run. We leave it to you as to whether you want to enlarge the slot which can be done with a simple hand file or drill gun.

Procedure to set and measure timing.:

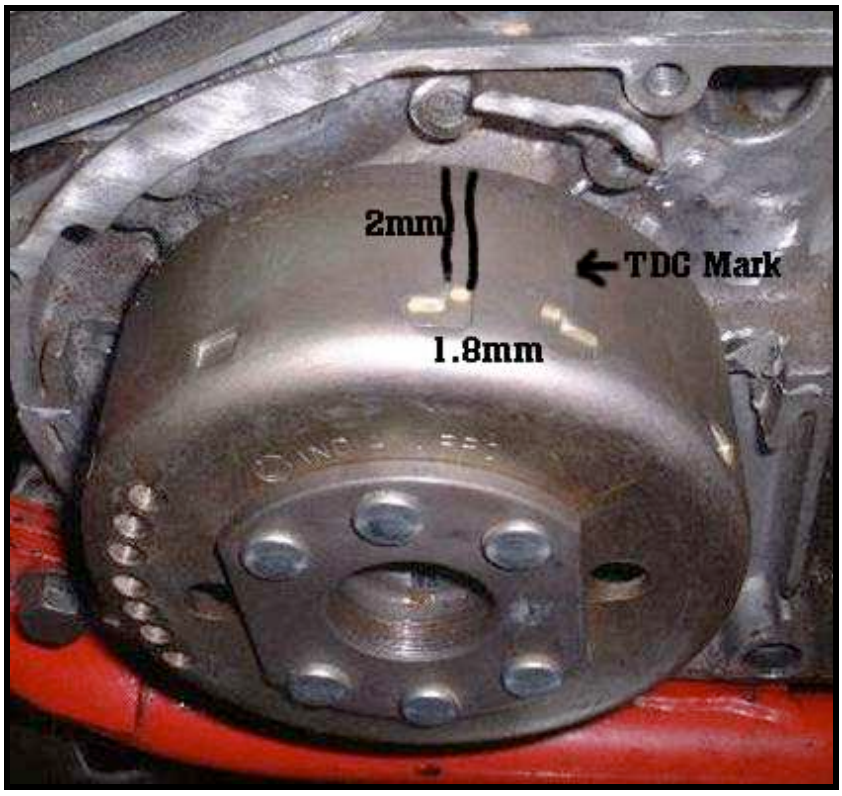
The procedure to set the timing is nearly identical to that on the LC/350 and RZ/350. And other modern two stroke bikes. That use a CDI

You will need a timing light and a dial gauge, to be accurate. Though in a pinch you could get away with a screwdriver to find TDC some black electrical tape and a timing gun.

Steps involved.

First find TDC using the Dial gage. At TDC line up any point on the magnetic drum to a fixed point on the coil plate or engine body. I normally use one of the dimples in the Mag drum that hold down the magnet and line it up to the Engine case. And draw a line here with a marker pen. To mark this position. If your Drum has lines you could use these.

Next decide what timing you want to run. The kit has been found to run without any problems from 3mm BTDC to 1.6mm BTDC. We recommend 2mm BTDC. Assuming you want to set the timing to 2mm BTDC you need to rotate the drum anticlockwise by 2mm using the dial gauge. If you don't have a dial gauge you can find TDC mark the Drum. Then stick a Piece of Electrical Black tape along the TDC mark. The thickness of the Electrical Tape which is a global standard should give you your timing. If you see the gap between my TDC and 2mm its about the thickness of a piece of electrical tape.



Now mark the drum again at this point. Start the bike and shine the timing light on the drum your mark at 2mm should line up with the fixed marker you have chosen on the engine body. Why don't we mark the Mag drum and Coil Plate before sending them out. Well that's because the same kit is being used on a whole ton of Yamaha bikes. We have customers running the same kit on their single cylinder Yamaha to R5, RD350, RD400.

By moving the coil plate Anti Clock wise you are retarding the timing. By moving it clock wise you are advancing the time at which the engine fires.

Suppose you find the bike is firing at 1.6mm and you want it to now fire at 2.2mm then move the coil plate clockwise. On the other hand if you time the bike and find that its firing at 3.5 mm BTDC and you need to set the timing to 2mm BTDC you need to rotate the brass plate anti-clock wise. Its easy to get confused with the terms advance and retard. Which is why I have quoted this example with a simple clock wise and anti clock wise examples. Just remember that rotating the plate anti clockwise makes the plug fire closer to TDC, rotating the plate clockwise makes it fire further away from TDC. Feel free to make the slot larger if required. Just because your bike ran great at 2mm on points doesn't mean the same will hold true for the CDI kit in all cases. Sometimes you have to try it a bit on either side to find a sweet spot. Don't ask me why just something we have observed.
Please revert if you have any doubts. Or if we can help in any way.

Regards
Chinoy

Some More recent pictures showing how the tape is used.

Ps: Latest Circuit Diagram can be found at http://eindiancompanies.com/cdi/cdi.jpg

Lastly:

Thank you for your faith in us. With your support and positive feedback the kit keeps improving. A special Thanks to those first few brave souls who ordered the fist kits.

I am by no means running a big company. Or work shop I am just a fellow RD Nutter like you. Who likes building things with my hands. The kit does not come in any fancy packing. And may lack the refinements of a big marketing budget. But I promise you that you wont be disappointed with its performance or the way it works. The kit also keeps improving and getting refined with each new feedback from our valued customers. As on date we have over 100 Kits out there running without any problem. If you do run into a problem mail me and we will have it sorted out ASAP

Understanding Timing By **Donny Petersen**

Ignition Timing

I don’t understand what advance or retard means or why ignition must be timed. No problem. First Let's understand two principles of setting the gas on fire inside your engine, which are "combustion lag" and "controlled burn."

Combustion Lag

Once you're hip to this. You'll be hip to advance and retarded ignition timing which is basically when the spark plug ignites the air/gas mixture.

It takes time for the gas to burn which obviously creates heat and the expansion of this heat creates pressure to force the piston down to turn the flywheels which causes the power train to turn the rear wheel. Heat and pressure are the same thing. And gas burns, at first, very slowly as the molecules heat up and set the actual process of igniting or ignition in motion after this "combustion lag" the gas burns at a very consistent rate.

Controlled Burn

This is extremely important because if you don't know at what rate the gas will burn at you won't know when to start burning it to get full combustion at the right time.

Octane

Octane makes the gas burn at a stable consistent rate. Without octane, the gas would explode causing great damage as opposed to a consistent burn. Back to combustion lag. The spark plug must spark sooner to allow for the extra time that combustion lag takes.

Advance Timing

This is called advancing the spark or advanced ignition timing. As we go on you will see that there are other reasons to advance the timing or make the plug spark sooner. "Controlled Burn" has basically been covered above as octane prevents explosions and causes the gas to burn at a rate that we can control. Because of this we can set ignition timing to occur at the best time to burn all the gas creating heat, which creates pressure to force, the piston down to create horsepower. So where must the piston be when the spark plug goes off? Theoretically, the piston should be at the top dead center, (TDC), as far up as it can go compressing the air/gas mixture on the compression cycle or stroke when the spark plug goes off. This means that ignition timing is at 0° with no advance or retard. However, in real life the spark goes off before this to allow for a combustion lag time delay and for the controlled burn to travel across the combustion chamber.

BTDC: Before Top Dead Center

In actuality, ignition occurs before the piston reaches top dead center, (BTDC). on the compression stroke.

ATDC: After Top Dead Center

Maximum combustion occurs after top dead center, (ATDC). This means that the spark plug goes off before the piston has fully compressed the air/gas mixture and before the piston has reached top dead center. This is way, way before the piston is on it's way down in the power stroke.

Advance, Retard Timing

Now, advance or retard ignition timing is measured in degrees of flywheel rotation before top dead center, (TDC), on the compression stroke.

Advance means that the spark goes off sooner; i.e. further from top dead center.

In any engine, the time it takes for combustion to occur stays the same.

However, if the engine speed increases so does the piston speed going up and down the cylinder.

Advance Curves

Therefore combustion must start earlier in the compression cycle to allow for the gas to burn completely and this is why we have advance curves. All this means is that the degrees of advance/retard change according to engine rpm increases or decreases and this can be plotted on a graph. Degrees of advance/retard are expressed in the amount of flywheel rotation. As engine speed increases combustion must start earlier, which means spark timing must be advanced.

Retarded Timing

Spark ignition timing is retarded when starting the engine because the pistons are moving up and down at a slower rate. As the engine rpm increases when the bike revs up and takes off the spark is advanced because of faster piston speed. Now, when the bike is motivating but under load the spark retards again because piston speed slows down. Let's use some common sense, as we now know a few basic facts to work from.

Dual Plugging and Timing

How about when heads are dual plugged? Does this effect when the spark plug should go off? Well yes it does, but why? The time it takes a controlled burn to cross the cylinder is reduced because there is a spark plug going off on either side. The time should be cut in half with allowances that must be made for combustion lag. Therefore timing should be further retarded or moved closer to top dead center. In this case, 5 to 8° would be appropriate. If we use the Evo Sportster® as an example, dual plugging would put the advance spark setting at 35° to 32° before top dead center. This is calculated by subtracting the 5° to 8° retard allowance from the stock 40° advance setting.

Stroking and Timing

Stroking means the piston must move further up the cylinder and down the cylinder in the same amount of time. Therefore, depending on how radically the stroke is increased, the ignition timing must be advanced accordingly. Remember that the gas burns at a controlled rate. Therefore it must be ignited sooner in order to be completely burned as the piston is being pushed down the cylinder by expanding heat and pressure on the power stroke.

Big Bore and Timing

How about Big Bore? Well, it takes longer for the flame front to travel across the increased diameter of the cylinder bore. Therefore timing must be advanced appropriately depending on the bore increase.

Dual Plugged, Big Bore, Stroker Timing

Okay! Now we get complicated since these engine changes are usually done in conjunction with each other. Life is but a compromise. Retarded timing with dual plugged heads must be compromised with advance timing requirements of the big bore cylinder and an increased stroke. How about adding nitrous which requires timing to be retarded? Yes, it gets to be a complicated compromise.

Improper spark ignition timing causes excess engine heat that causes excessive engine damage.

Let's Test Your Knowledge

Now let's briefly look at other situations and how they effect ignition timing. How and WHY do the following affect Ignition Timing?

Cold engine:

Hot engine:

Lower compression ratio:

Increased compression ratio:

Now here are the answers.

When the engine is cold more spark advances is required because combustion lag increases conversely a hot engine requires less spark advance. With the lower compression ratios common in today's engines, combustion is slower and therefore more spark advance is required. Conversely higher compression commonly used in Hop-Ups allow for spark to be retarded since combustion will be faster. Other factors that will effect when the spark plug goes off would include; fuel volatility, fuel mixture, air to gas ratio, high octane fuel as opposed to low octane fuel. And how about combustion chamber shape, position of the spark plug in the cylinder head as well as the efficiency of the particular engine being timed. The general principles of advance and retard ignition timing are pretty easy to understand but exact timing for your engine should be left up to technical experts especially if your engine has been modified. Once explained this is a pretty easy subject that can get real complicated real fast