Adjusting electronic ignition on 2-stroke stator kits

Many of our ignition kits are designed specifically for an individual model and are supplied with pre-set timing so the stator is simply fitted with no provision for adjustments. Such ignitions assume a standard or lightly tuned engine. However where an engine has had significant work, EG porting, a specially made expansion chamber, changes to compression, crankcase volume, squish band or simply the tuner wishes to experiment with the ignition timing to look for more power, a stator that has adjustment slots to allow changes of the static timing advance is required. We point out that as with all engine tuning the person commissioning the engine assumes full responsibility for its correct adjustment and set up. All of our kits can be machined to make them adjustable if needed.

Engines may have no timing marks or ones that show advanced timing at a certain RPM or static timing, often its not clear which. These will not be of any use when timing up your new electronic ignition. This dictates you must make a new set of timing marks. While this may seem like a daunting task, if the work is carried out methodically you will soon find the process extremely straight forward. Its possible to achieve a much higher level of accuracy using this method than timing marks on mass produced parts. Most professional engine tuners will not trust production timing marks and instead prefer to 'dial-in' each engine. The aim of this guide is to illustrate our preferred method of setting adjustable stator kits.

Tools needed

DTI and suitable mounting base or adaptor
Strobe lamp with inductive clamp
Engineers set square
Scribe

What's involved

The object of the exercise is to create timing marks on the flywheel to show an advance timing point (we use the static figure for 2-stroke engines) and TDC. These will relate to a fixed index on the engine case which can be as simple as piece of TIG wire held in place by a bolt in an engine cover retaining position. The initial marking of the flywheel is by far the most time consuming and MUST be done with a high degree of accuracy. Clear, defined lines that are square to the edge of the flywheel are essential. A DTI is required to accurately position the piston but once this initial work is done, checking the ignition timing becomes simple. With the flywheel marked if you want to adjust the timing again, first accurately set the piston to TDC, then align an index to the TDC mark on the flywheel. Once this alignment is set the index will then accurately show the ignition timing advance when a strobe lamp is used on the running engine. It is that simple.

What is the timing figure?

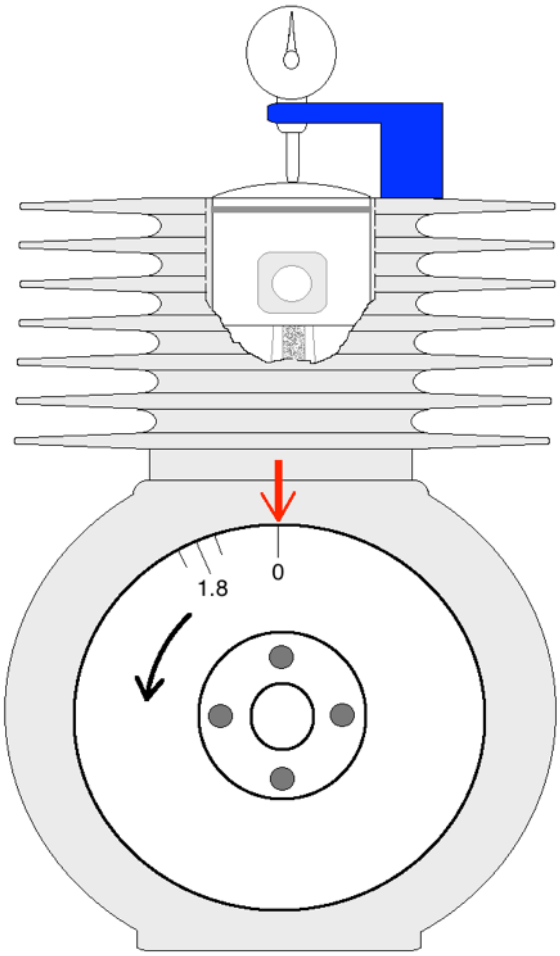
Our own kits normally have the static timing in the approximate centre of the adjustment slots. This is given as a guide not a definitive setting. If you are using this guide to help while modifying a kit to suit another model or to set up a kit we did not manufacture, we recommend that you start by using the standard 'static' timing figure for your engine. If the machine was originally fitted with points ignition this will be the figure given in the manual. Although we call this the static figure, electronic ignition can only be checked accurately with the engine running. We set the timing to this point with the engine at idle using a strobe light.

If your machine had an early CDi ignition some caution and detective work maybe needed especially where timing is quoted at a specified RPM. This is rarely the static figure! You may have to ask a specialist mechanic, owner's club or try your own experimentations to find a suitable setting.

Adjusting electronic ignition on 2-stroke stator kits

Getting Started

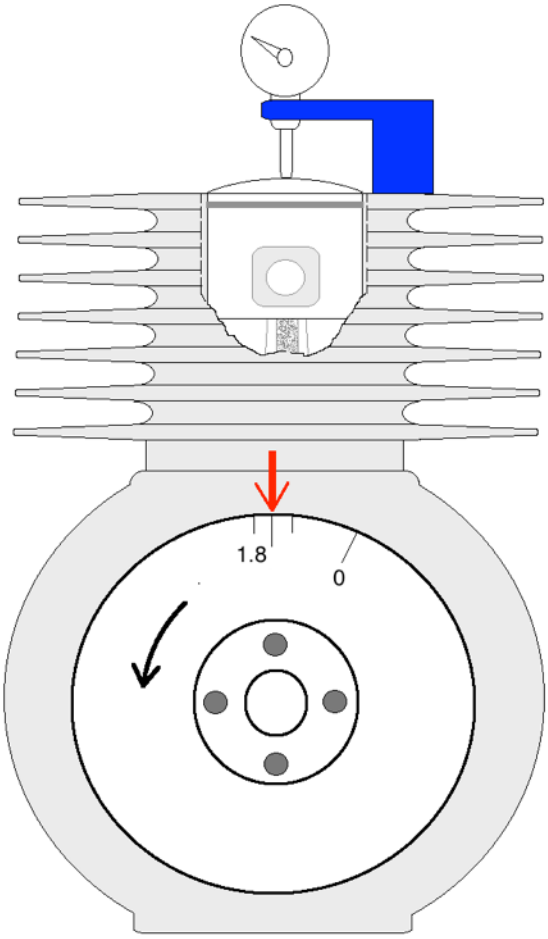
If you do some research you will soon find that there are various different methods to achieve the goal of marking the flywheel. It does not matter which you use, however all methods require the highest degree of accuracy. Our preferred method is to use a DTI mounted to the engine. We often remove the cylinder head to achieve this, however if the spark plug hole is perpendicular to the crown of the piston there is no reason why you cannot buy or machine your own DTI adaptor that screws in the spark plug threads. However if the spark plug is set at an angle other than 90 degrees you must remove the head as the DTI will not read accurately enough.



With the DTI suitably secured to the engine turn the crank in its normal direction of rotation until the piston reaches TDC. You will find that you have to over shoot and watch the DTI start to read in the opposite sense a few times before you find the exact point. When you are happy, zero the DTI

When setting the DTI to zero always approach TDC by turning the crank in its normal direction of rotation. If you over shoot, go back and start the approach again.

When you are happy mark flywheel to correspond with your index



Once TDC is marked, make another mark for the static timing advance. Be careful to ensure you mark this BEFORE TDC and not after.

In this example we have marked 1.8mm BTDC as the static figure. As before this position is approached turning the engine in its normal direction of rotation. When the DTI reads1.8mm BTDC we made another mark on the flywheel exactly in line with the index.

We then went on to make two other marks either side, one at 2.0 mm and 1.6mm BTDC. A range of marks is often useful. You do not need to make them every degree however!

Adjusting electronic ignition on 2-stroke stator kits

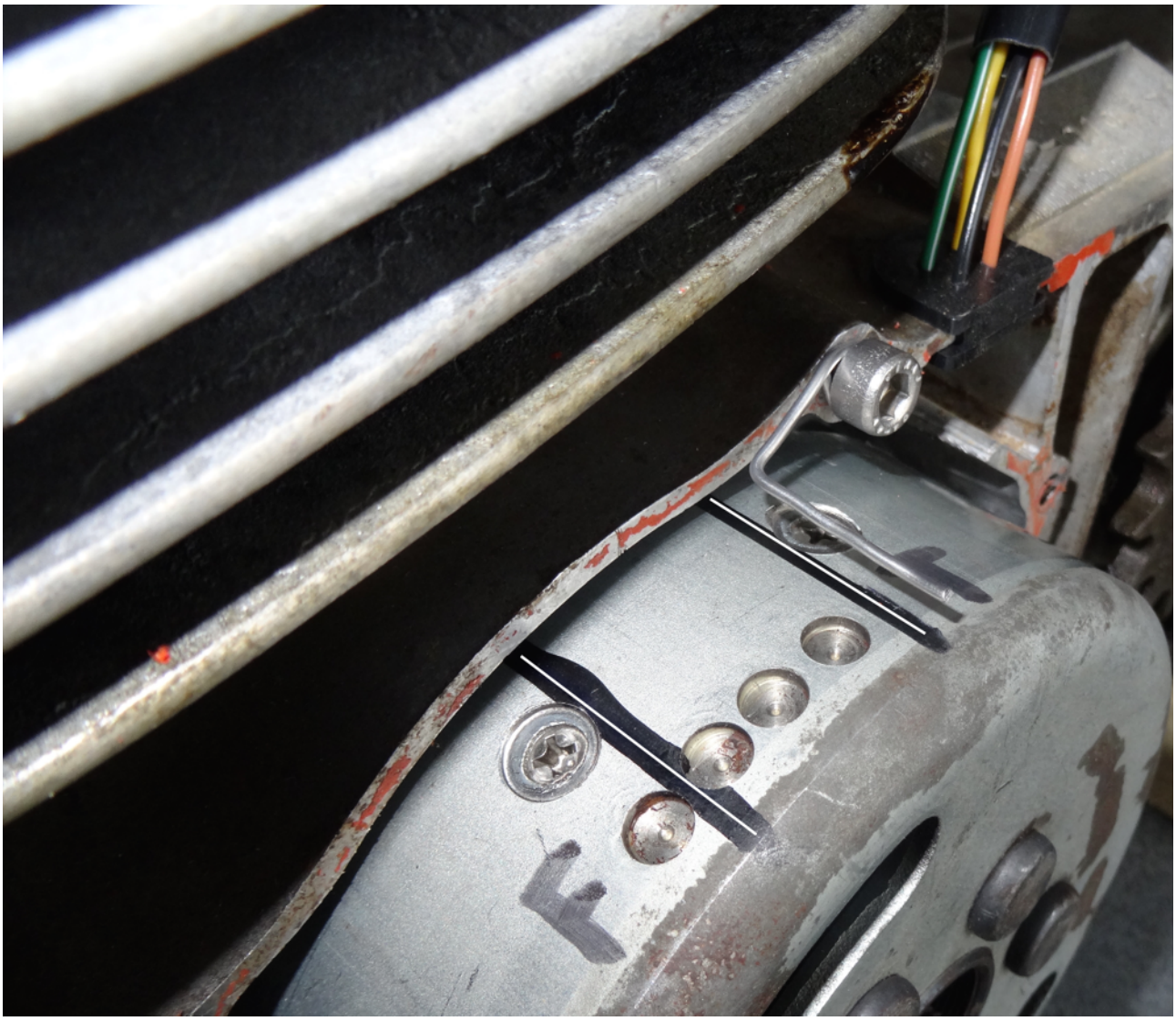
Marking the Flywheel

First make a small scribe inline with the index. Repeat for the advance mark(s). The flywheel should be removed and these marks defined and extended. This needs to be done using a scribe and set square. Note while we have used thick marker pens in these photographs, this has been done only to highlight the scribe marks in the photographs.

With the engine in the correct position, make a small scribe mark to correspond with the index

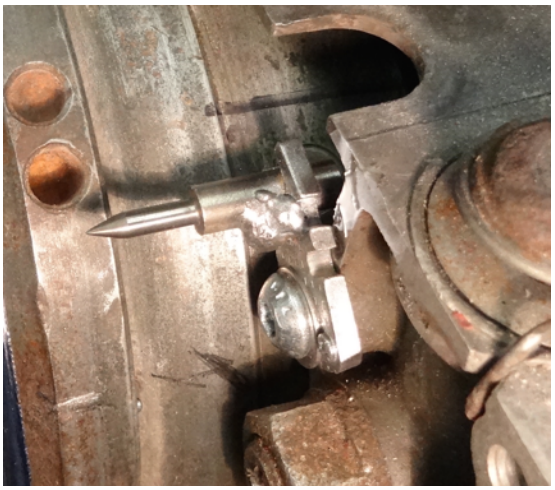
With the flywheel removed extend the small marks you made using a set square to ensure they are perfectly at 90 degrees to the edge of the rotor. It is vitally important to ensure the lines are at 90 degrees and do not 'wander' as this will reduce accuracy.

We have used black marker pen to highlight the scribe line.



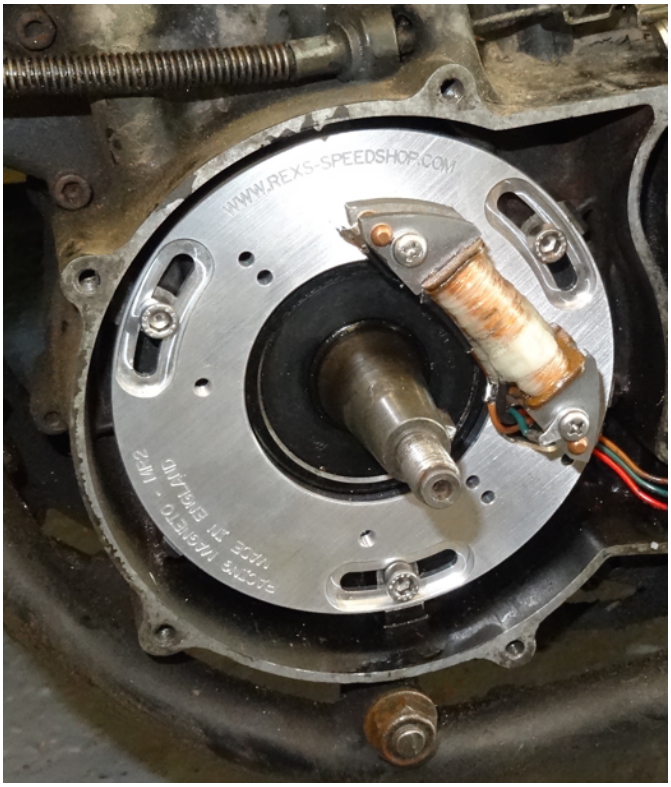
Flywheel now marked with a static ‘F’ mark and TDC. You can add extra marks either side of the ‘F’ mark, however there is no need to mark every degree. Every 2 or 5 degrees is usually sufficient. Make these marks shorter, so that the static mark remains clearly defined.

Although we used a piece of wire in this example there is no reason why you can’t fabricate a more rigid index, designed to fit to one place. Below is an example we made to suit one type of engine:



Adjusting electronic ignition on 2-stroke stator kits

With the flywheel marked, mount the ignition kit as per the fitting guide. Use a strobe lamp to show the timing position. To adjust the static timing position the flywheel may have to be removed to access the the stator adjustment slots.



This is the point where the person tuning the engine has to decide where to set the timing according to how the engine responds. It could be that the stock figure remains suitable, in many cases the engine benefits from a slightly different setting. The engine tuner must use their skill to ensure the engine starts, idles and performs under load as intended while not allowing the ignition timing to become dangerous for the particular way the engine has been tuned.

Note that performance 2-stroke timing is dynamic, IE has both an advance and retard. See “Further Notes on 2-stroke Ignition Timing” for more information.

Glossary

TDC	Point where the piston reaches its maximum height in the bore.
BTDC	The piston is approaching TDC when the engine is rotated in its normal direction
Static Timing	A single defined point, often used as a reference set set the timing to.
Timing Curve	Variation of the ignition advance compared to engine RPM. This is calculated by the ignition unit. Not to be confused with the static timing which is a single point.
DTI	Dial Test Indicator. Standard engineering measuring device.
Porting	Refers to changes in shape or position from standard to the ports in the barrel wall.
Squish	Area of cylinder head above the piston that directs gases to the combustion zone.