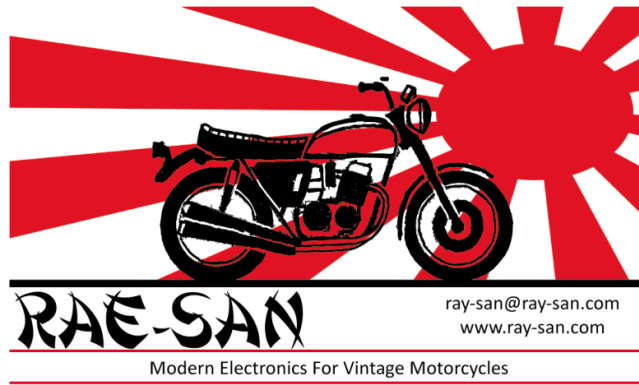




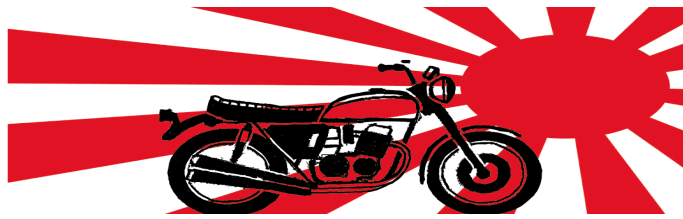
V4.0 HALL TAI Ignition Module

Installation Manual

DRAFT

Rae-San

12/12/2019



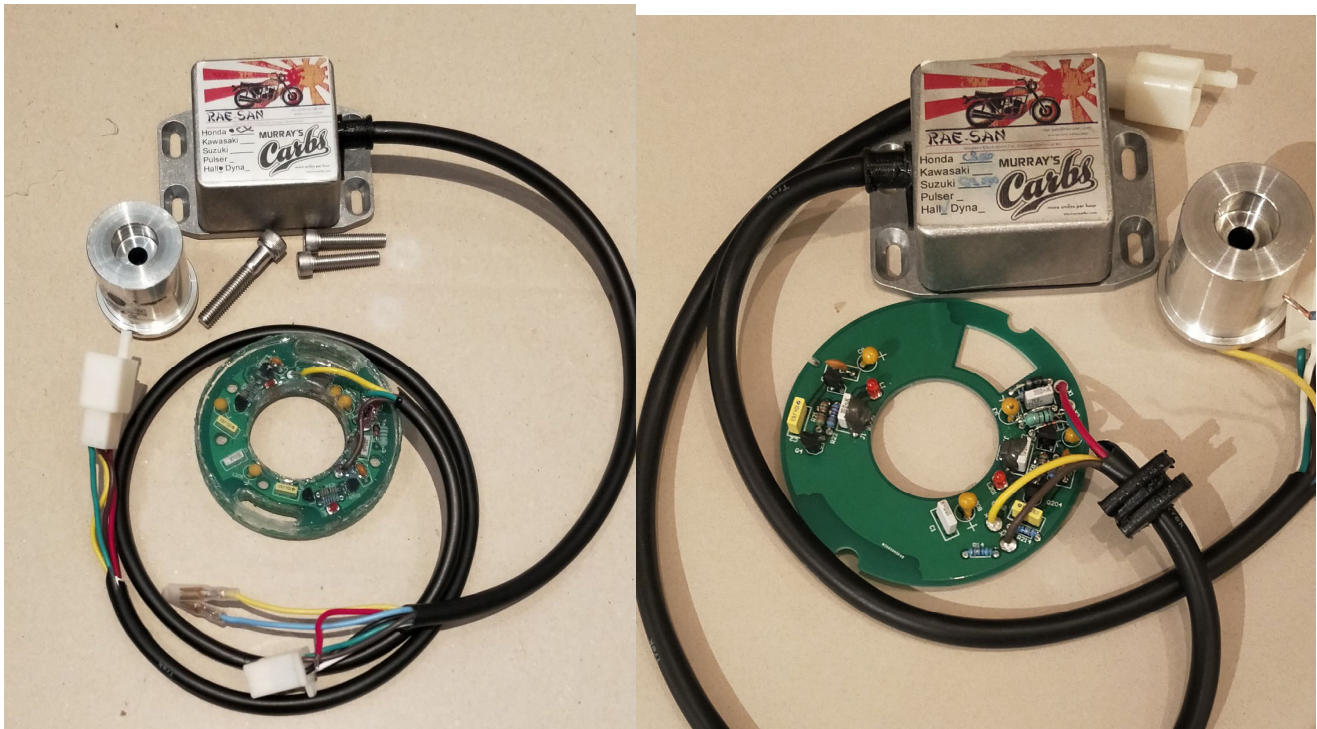
Rae-San V4.0 HALL TAI Ignition Module

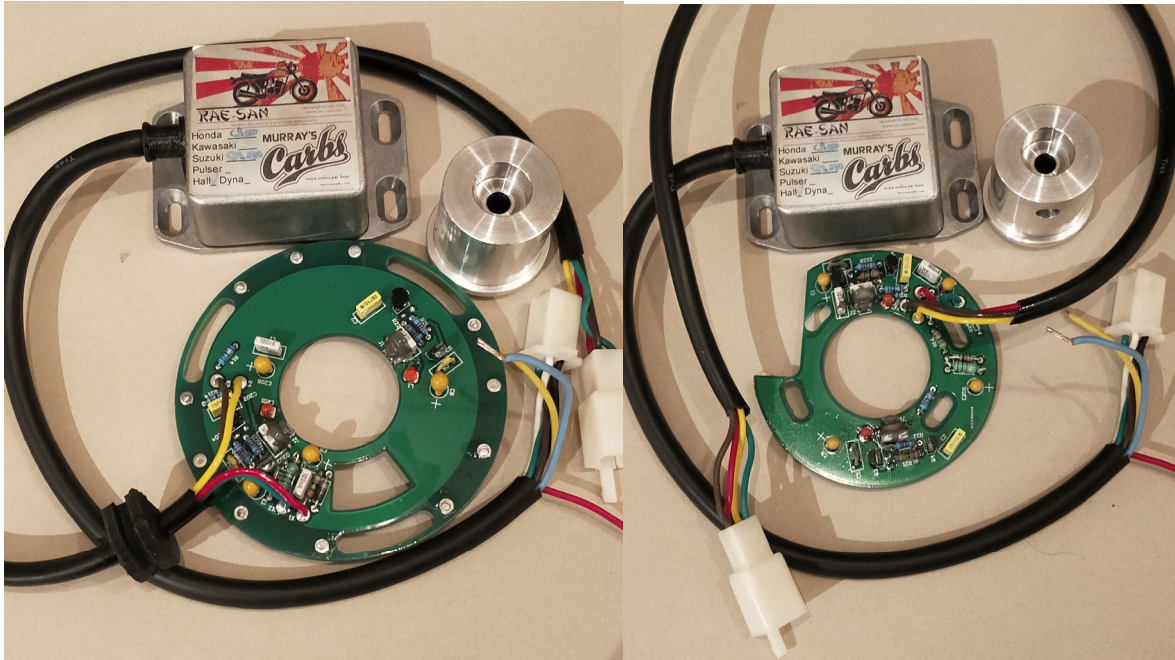
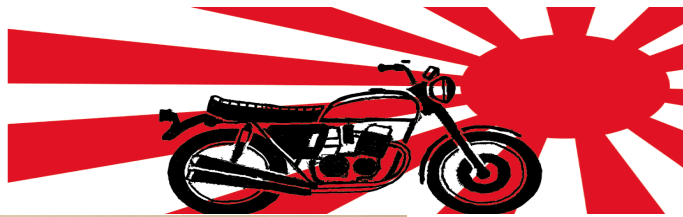
Congratulations on your purchase of a new ignition setup for your motorcycle.

Your Kit should be similar to one of the pictures below.

CX/GL TAI kit- 12V Kit –

Note that the CX variant has a different rotor and hall pickup to most other bikes – it's a bit “special”.

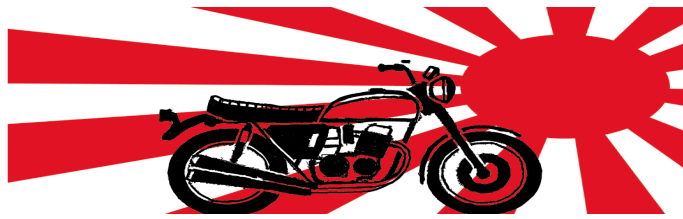




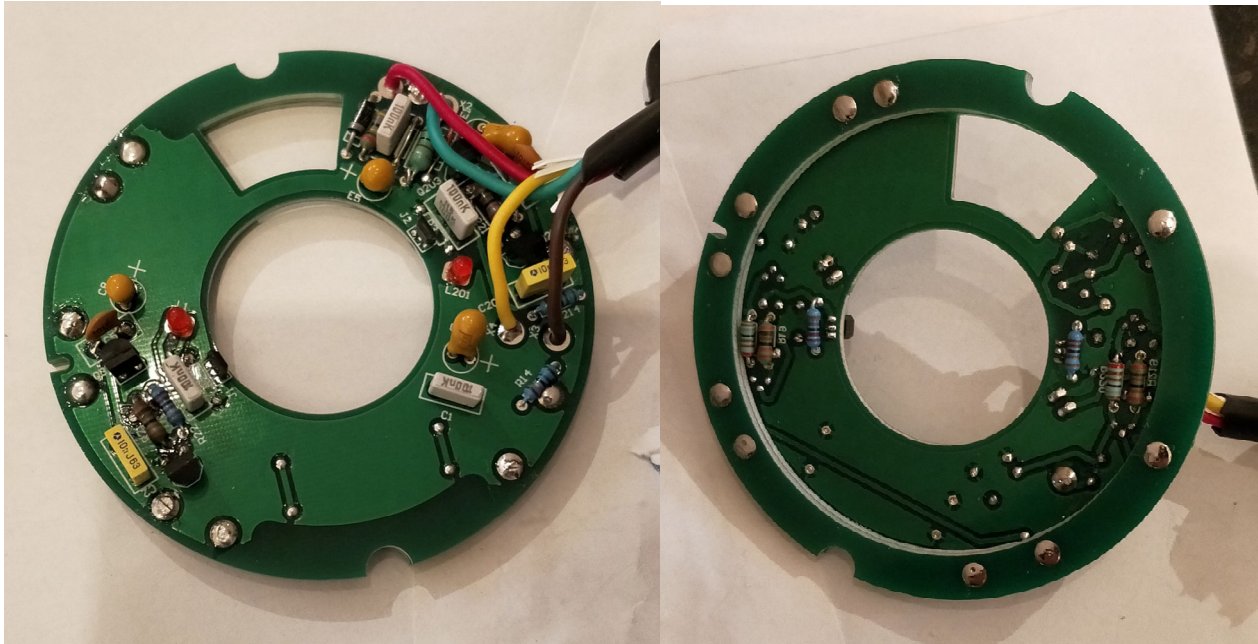
Depending on the actual bike selected there will be a suitable Hall Pickup Plate, Rotor and some extension wires.

Some kits may include an optional Relay and wiring if that option was selected at purchase.

Some of the alternate hall plates are shown below. Most will have a space built in to ensure the plate clears the rotating timing rotor.

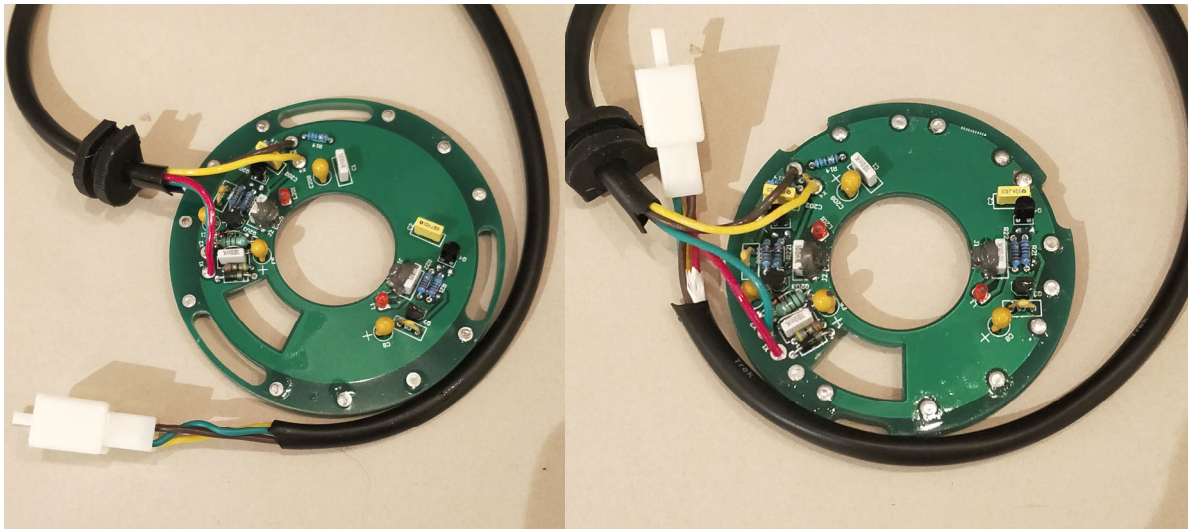


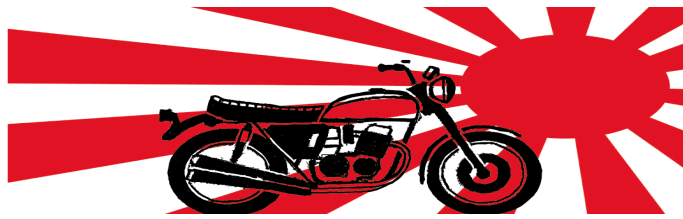
CB750 – 1100 top and bottom - +others



CB 550 / GS 550 style + others

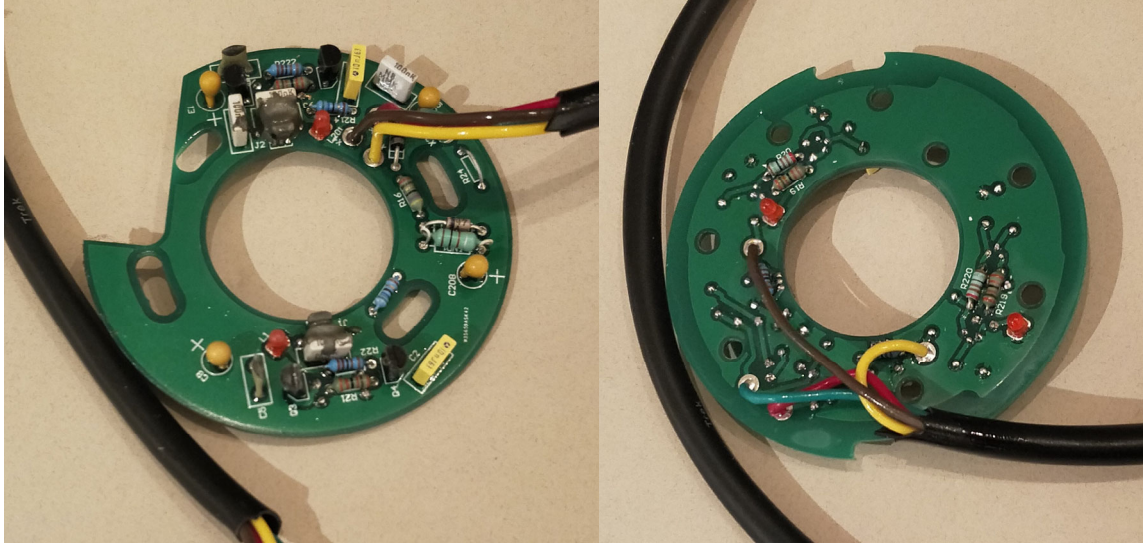
CB 650 style





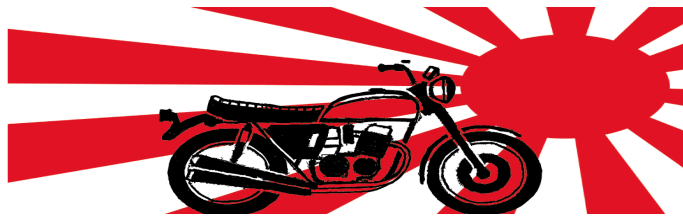
GL1100 style

CX 500 / 650 TAI



All Rae-San versions have the following features:

- Operates of 12V only.
- Provides electronically adjusted advance.
- Provides extra delay during cranking - START ASSIST for easier starting and less stress on the engine. Particularly important for the CX 650and GL700 in cold weather.
- Provides ability to choose from 4 standard advance profiles for the bike chosen.
- Provides adjustability of the profiles via reprogramming.
- Provides 2 stage RPM limit - progressively retards timing over 2000 rpm - then stops firing >2000 rpm over selected limit.
- Provides pre-set RPM limiter to protect your engine.
- Provides 4 selectable advance/RPM limit profiles.
- Fully electronic.
- Contains two completely independent circuits - one for each cylinder to provide failsafe redundancy.
- Provides power cut-out to protect ignition coils in the event of stalling.
- Provides higher spark energy than original due to 0.25 ohm output resistance driver.
- Existing kill switch functionality is retained so there is no need to rewire switches.
- Dwell limiting - provides coil protection for any stop position
- Coil Protection -if engine stops on a trigger - coil will be disabled after 20mS
- Delayed startup - 2 revolutions required before spark starts to ensure lubrication.
- Comes in a waterproof metal box with harness to pretty much plug and play



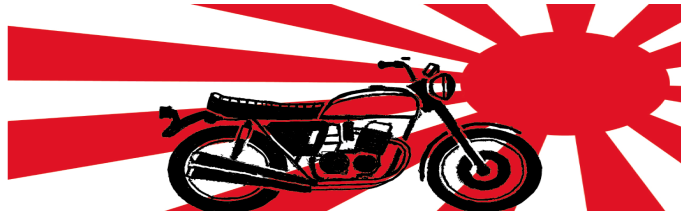
Installation

Hall Plate Installation

- Remove old plate, grommet and wiring.
- Remove advancer mechanism.
- Remove centre rotor that move to perform mechanical advance from the advancer mechanism.
- Remove springs and weights –
 - Pop these components and the removed rotor in a zip lock bag and store.
- Put new supplied rotor on the advancer
 - Lock washer under the bolt to ensure that the new rotor will be locked into place.
- Replace advance assembly back into bike.
- Place hall plate in place of the old timing plate
- Position the wires out of the way of the spinning rotor and clear of sharp edges on the case.
- Put grommet in the grommet slot in the cover
- Secure hall plate with screws and nylon washers – window should allow observation of the timing mark pointer as per the original hall plate
- Loosely secure the advance assembly with new rotor as we need to adjust the timing yet.
- Ensure that nothing impinges and that the rotor is centred in the hall plate hole when the engine is rotated by hand.

Control Unit Installation and test

- Mount the control unit in a suitable location – preferably under a sidecover or in the location of the original ignition controller (remove the Controller cover first so the LEDS are visible ready for testing).
- The controller case forms the GROUND connection for the ignition coil current so it needs to be a **GOOD SOLID, SHORT** connection to the bike frame, negative earth.
 - IF a direct screwd conection to the chassis is not available then a SHORT lead capable of carrying multiple amps should be made using lugs and bolts to the controller case.
- Route and Plug 4 pin connection from the Hall sensor to the Controller.
- Connect the Red wire power from the Controller though the fuse to switched power – either from the bike or the relay as appropriate.
- Run the wires to the coils but do not connect at this time until after checks are performed.
- Remove the Controller cover over removal / diagnostic leds / timing
- **Double check Power connections and polarity**
- Switch on bike power –
- Rotate motor and ensure that the Red LEDS on the hall plate illuminate when the magnet is passing and that the Green LEDS on the controller mirror them.
- Perform the timing as outlined in the timing section below.
- Set the desired timing / rev limit value according to the section below and the timing table.



- Turn **off** the bike power
- Connect the coil wires to the coils.
- Replace the cover on the Controller
- Re-secure the controller.

Optional Relay Installation

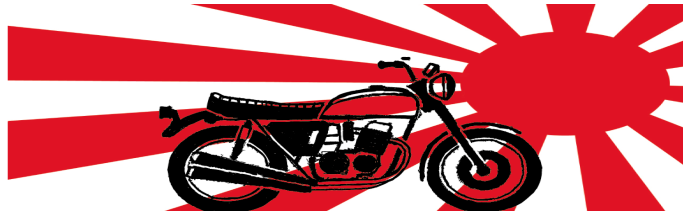
- See schematic –
- Pins on the relay as per numbering

Coils

- OEM coil
 - Connect the supplied leads (blue and yellow) to the coils on the side opposite to the 12V connection.
- Aftermarket Coils
 - Depending on the coils chosen you might need to make some mounting modifications
 - In general the +12V from the switched power of the bike ignition or via the relay will go to the + side of the coil (if marked) and the lead to the Controller to the other side of the coil – just like the OEM arrangement.
- Coil Pack
 - Mount as per needs – suggestions to come
 - Plug in numbered leads to the appropriate cylinder
 - Run to the coil pack corresponding output – trim to length and re-terminate if required by unscrewing the plug cap – cutting the lead to the desired length and rescrewing the plug cap on – ensuring that the screw thread engages the copper wires in the core.
 - Connect the coil pack lead to the Controller unit (blue and yellow)
 - Connect plug to the coil pack.
 -

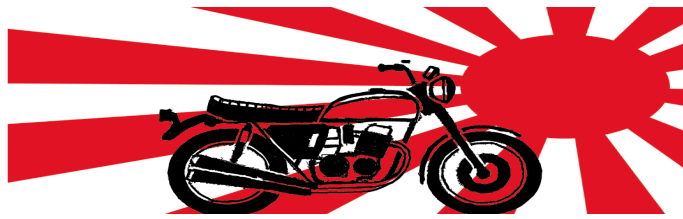
Settings

- Refer to the timing sheet and jumper position diagrams at the end of this document.



Powerup

- All checks passed above –
- Ensure suitable fuse 5 -10 Amp installed
- Switch bike power on
- Press start button
- Should see rotor rotating and LEDS flashing on the hall plate
- If all is good – connect the wires to the coils and try again
- With if timing is correct and coils are not crossed over bike should fire up
- If coils are crossed – backfiring will likely occur – swap wires blue – yellow at coils.
- Leads can be pulled and a spark plug inserted to check for spark as per normal
- Timing lights can be used.
- **Note that a spark will not occur if the engine is being cranked at less than 180 RPM**
 - **Cranking is generally 300RPM +**
- **Spark will not be seen until 2 or 3 revolutions of the crank have occurred at at least 180 RPM. This is part of the protection and not a defect.**



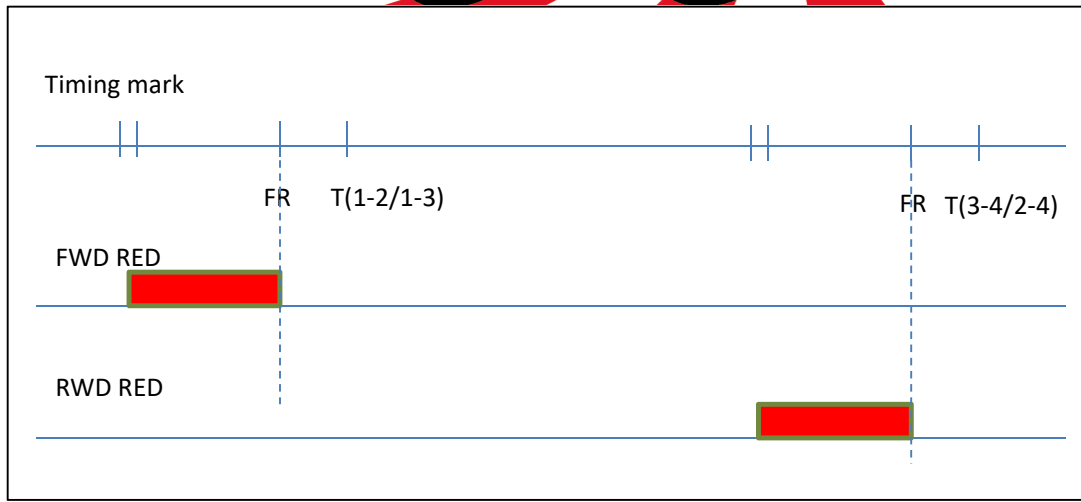
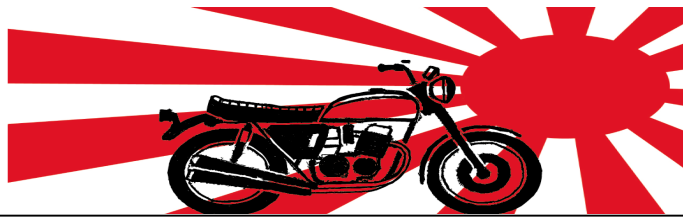
Timing adjustment

- Loosen the Central rotor bolt to adjust the timing of the new rotor–
- Set the timing mark to full Retard – on 1-2/1-3 as marked on the timing plate by rotation of the crank.
 - This will usually correspond with the forward hall sensor regardless of which side of the bike the sensor is on – but do check which sensor corresponds to which coil and cylinder numbers to ensure you time the correct one.
- Rotate the rotor in the direction of engine rotation, until the 1-2 hall LED turns on (forward one).
- Keep rotating the rotor until the LED just turns off – this is the position desired – tighten the bolt to lock the rotor in this position.
- Rotate the engine 180 degrees and carefully check the position at which the 3-4 (2-4) LED (rearward) turns off – it should be very close to full retard on 3-4.
- Ideally the error can be averaged between the two by moving the rotor slightly – but for now as long as the error is small it's good enough.
- When tightening the Rotor bolt – ensure the lock washer is holding the central rotor locked to the advance rotor- these should not move relative to one another as it will alter the timing.
 - The original system used a movable rotor on the advancer to perform the advance with springs and weights.
 - The new system calculates the advance electronically so the rotor remains fixed relative to the advancer.
 - Once the first pass timing has been done as above – it should be checked and fine-tuned a little more.

To Summarise:

Rotate the engine and note where the 1-2 (1-3) and 2-4 (2-4) RED LEDs turn ON with regard to the Full advance marks and turn OFF with regard to the full retard marks.

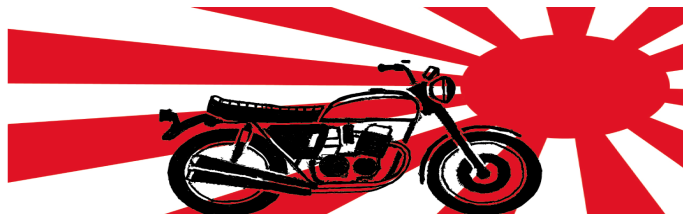
What you are trying to achieve is shown in the diagram below. Where the RED blocks show where the RED leds would be on. Really we are looking for turn OFF at the FULL RETARD mark as we rotate the engine.



Rotate the engine and check that the turn ON of the RED LED occurs near the Full Advance marks – these are usually a pair of lines || before the | 1-3 and | 2-4 marks that indicate the stock full advance range.

The turn OFF location is more important than the turn On location, as the OFF location affects starting and idle.

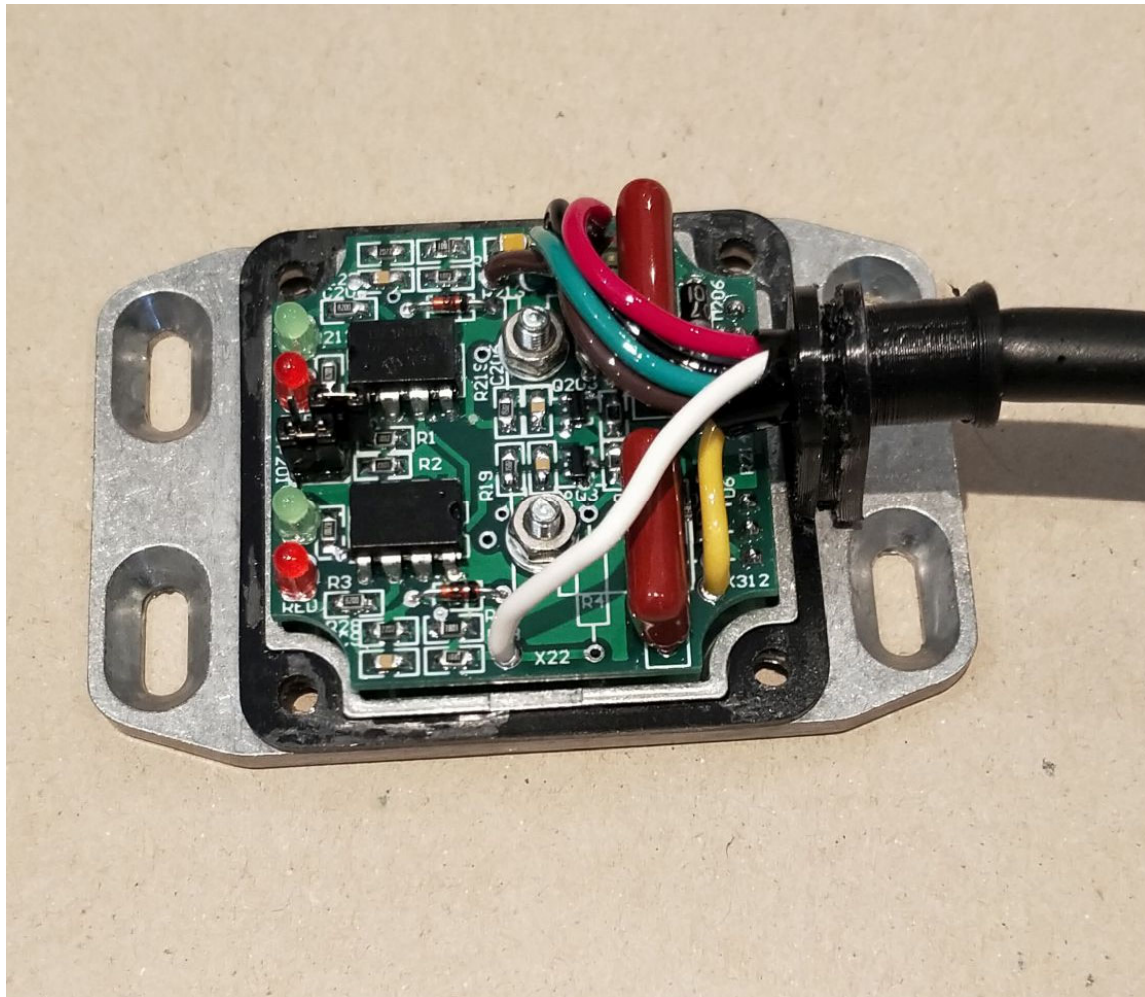
When happy with the location – do the screw (bolt) up snug.



Under the Lid – Profile change and Diagnostics.

4 screws hold the lid in place with a rubber edge seal – undo these 4 screws and then slide the cable grommet out of the slot in the lid to remove the lid. Reverse process to assemble.

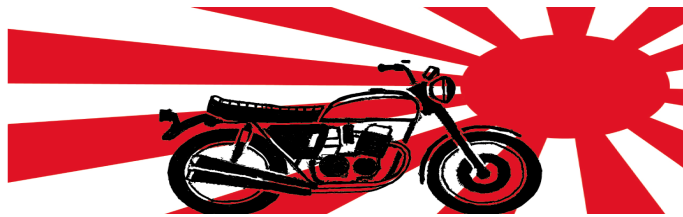
The Rae-San ignition Module contains a small number of configuration options and diagnostic LEDS



AS can be seen there are two pairs of red and green LEDS at the LHS with a jumper block in between.

A pair of red and green LEDS on one side of the jumper block indicate a “channel” which goes from one input hall sensor though to driving one Coil.

The Green led illuminates when the hall sensor is triggered. The Red illuminates to indicate firing of the coil.

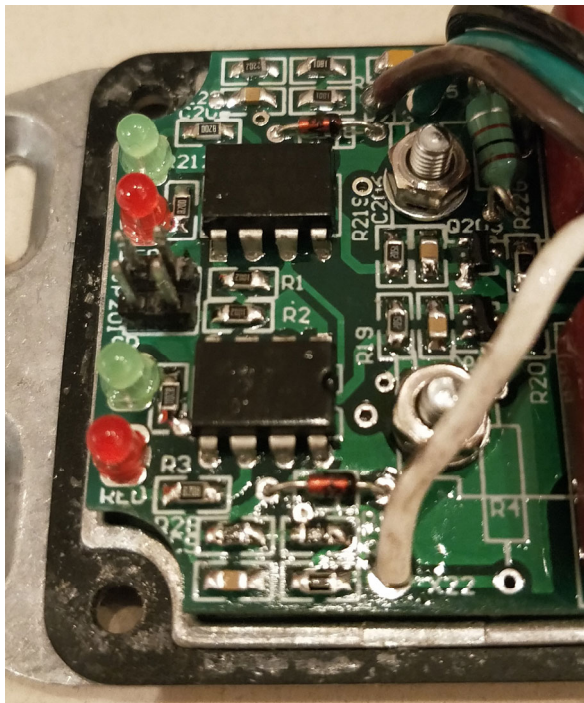


For the TAI version there are 4 ignition timing curves and rev limits that may be selected from on the board.

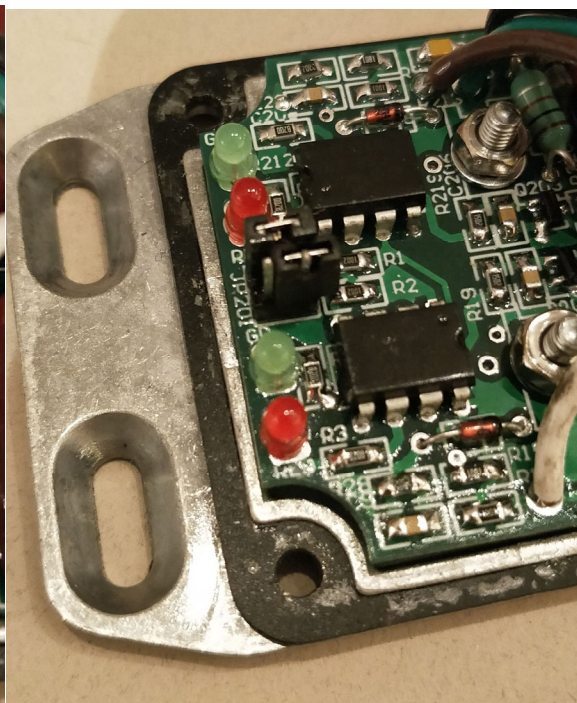
Please refer to the timing sheet at the rear of the document that will have the values programmed for your bike listed against the jumper positions.

Images below illustrate the jumper positions .

POS A



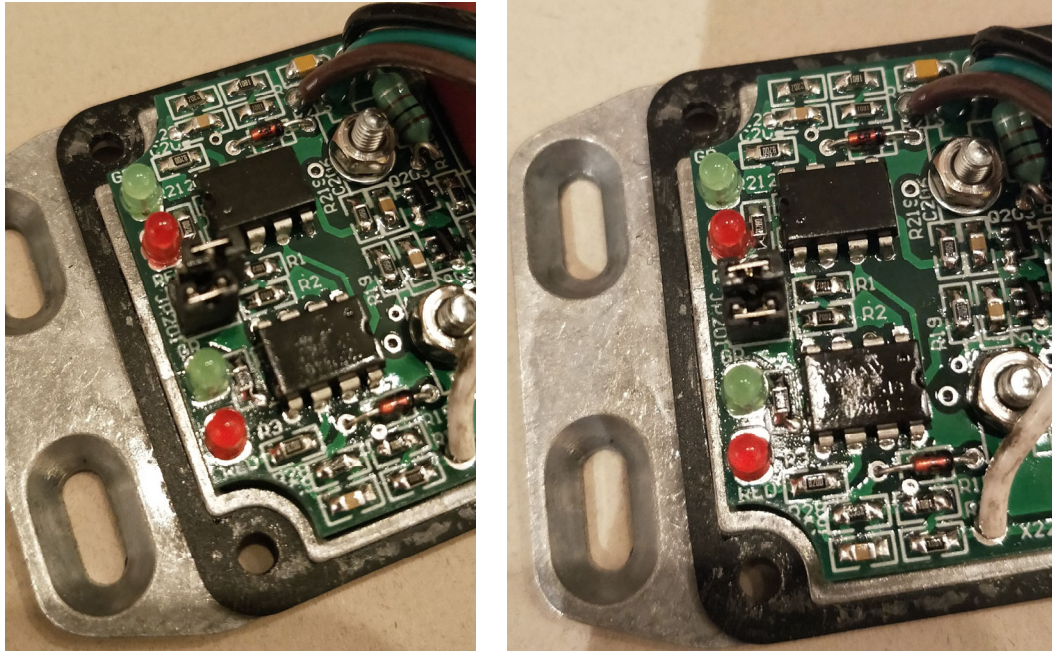
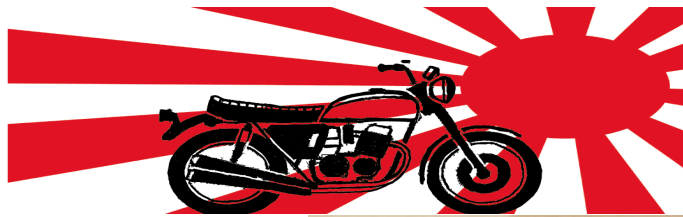
POS B



POS C



POS D



Operation

In operation there should be nothing to do – the module should behave similarly to the original ignition. (or better)

Recommended Coils

The OEM coils are about 3.3 ohms – many aftermarket coils are also available in the 4.0 to 3.0 ohm range and are suitable – High output coils are available down to about 2.3 ohms – lower than this should not be used with TAI output as unnecessarily high current will result – the dwell has been set on the system around the 4.5 – 6 mS mark to give best results with OEM or similar coils.

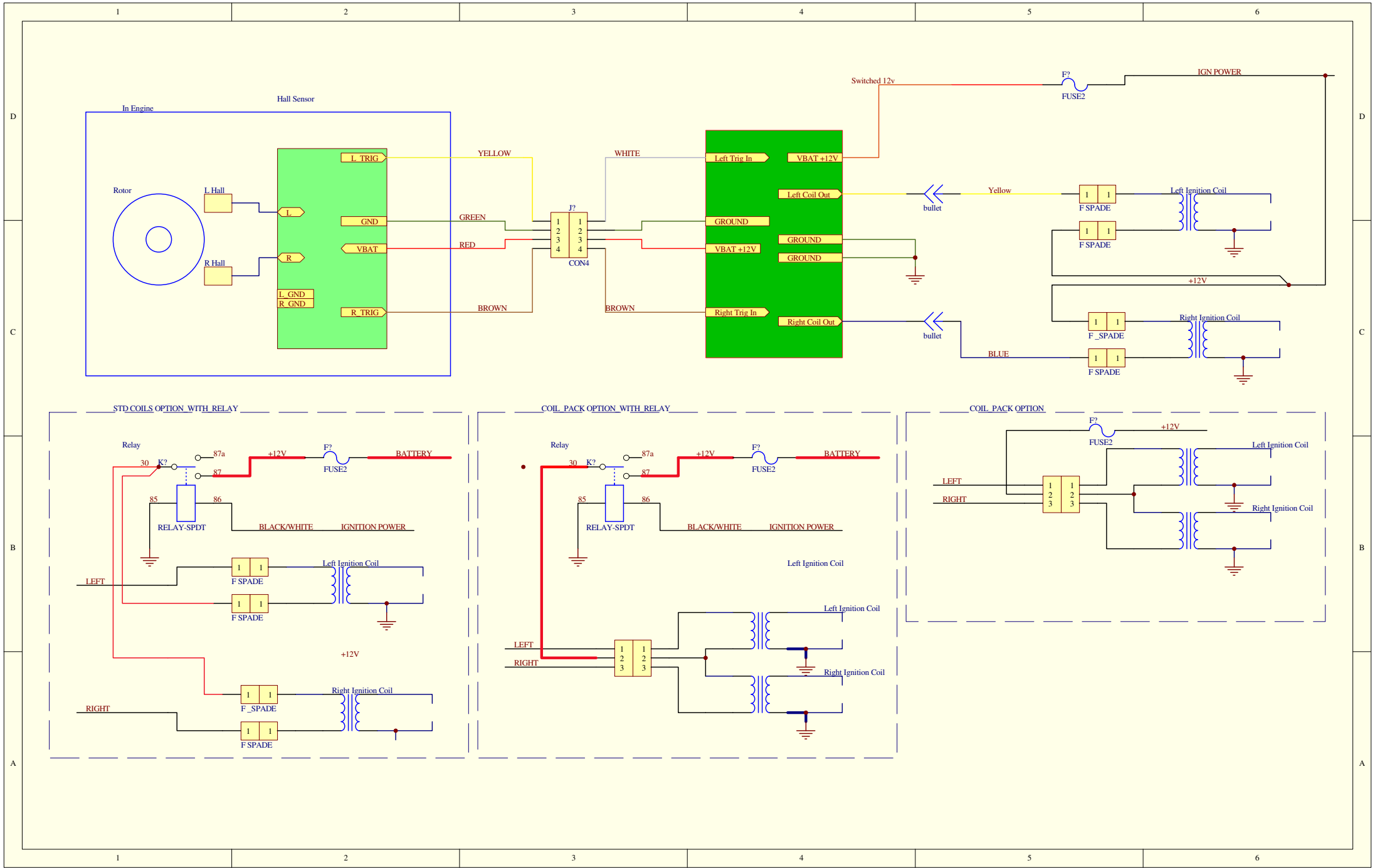
Points type coils have higher resistance and often a series resistor to limit the current. They are not really suitable for a dwell controlled setup – as they will result in a lower spark energy.

For 4 cylinder engines – dual output coils are used, for 2 cylinder single output coils are needed.

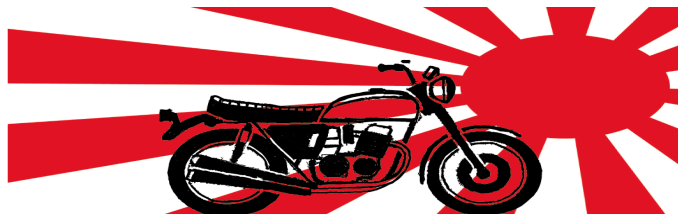
LS2 coils may be used with the Rae-San LS2 Adaptor module.

Connections

The connection information is shown on the diagrams – note that a GOOD ground to chassis should be provided to the main power connection – this carries the coil current and the shorter the better.



[illegible]



MOTORCYCLE PRODUCT DISCLAIMER

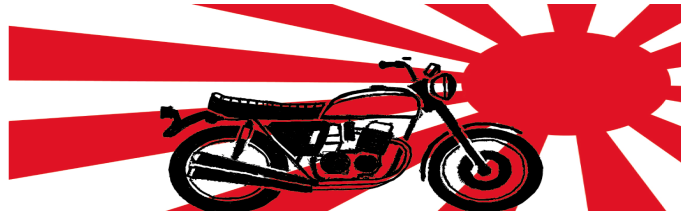
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