

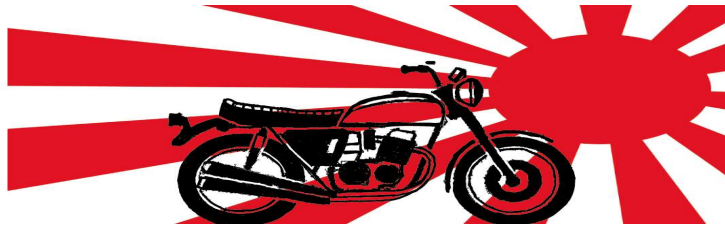
V4.2 CX HALL Ignition Module

Installation Manual

V1.0

Rae-San

05/05/2021



Rae-San V4.2 CX HALL 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”.



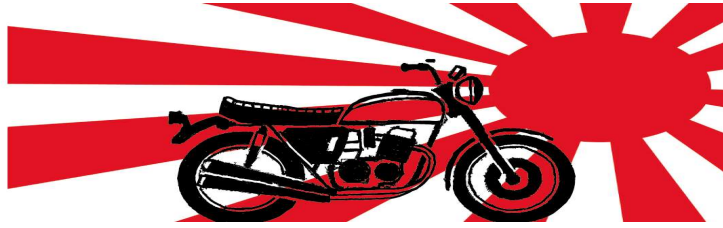
CX CDI HALL KIT

CX TAI HALL plate

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

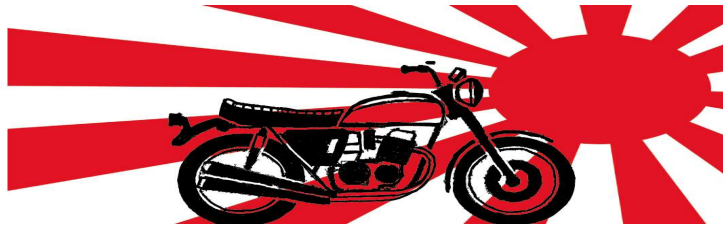
Some kits may include an optional Relay and wiring if that option was selected at purchase.

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.



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.
- Wont fire until the third pulse and engine rpm must be greater than 180rpm. Ensures engine is up to cranking speed so as not to cause undue stress.
- 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 – CDI Hall Effect Sensor

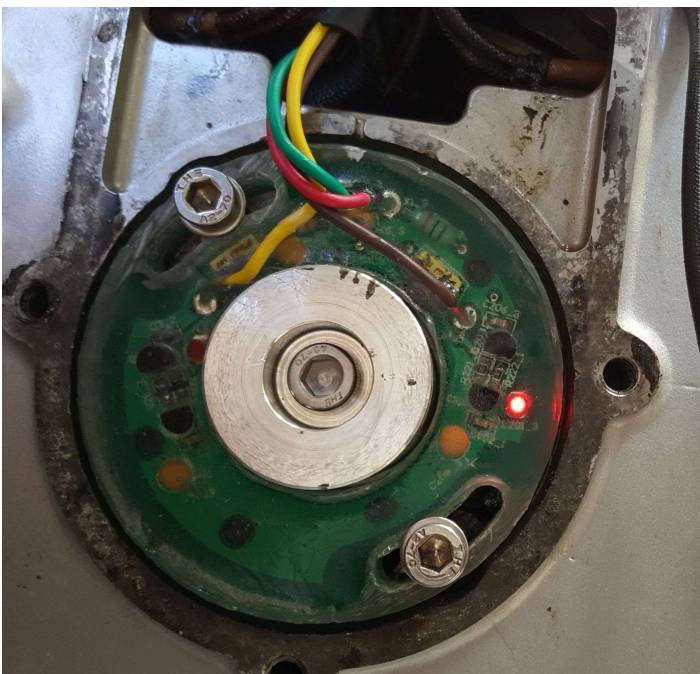
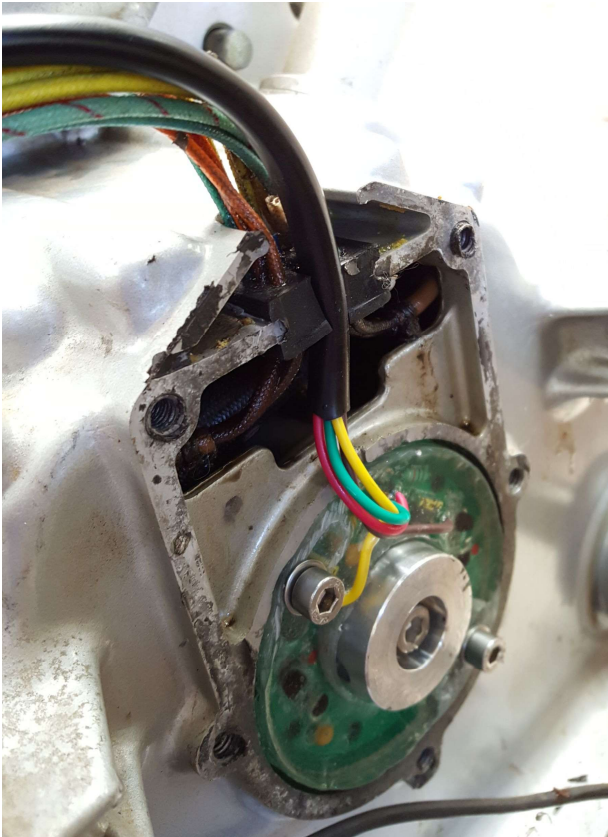
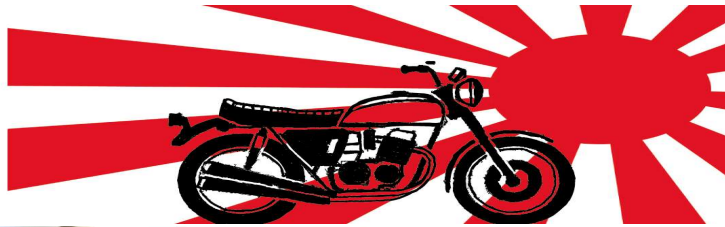
The process is easiest if starting with the engine out of the bike. It is possible to do the install in the bike with a lot of fiddling and removal of the water bottle – or swinging the engine down at the rear maybe – but I'll show the process with the engine removed as this allows for easy access and photography.

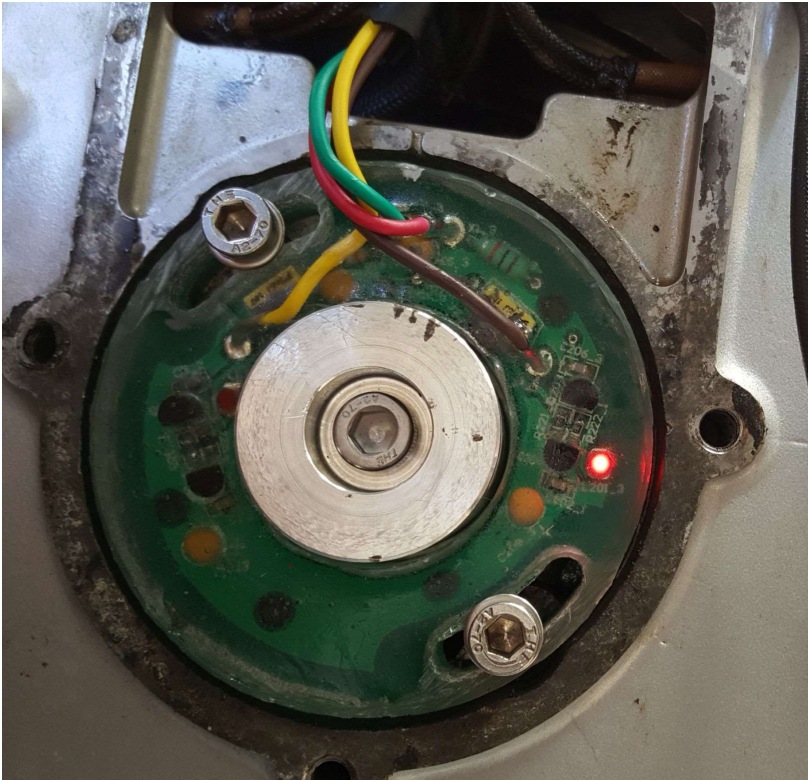
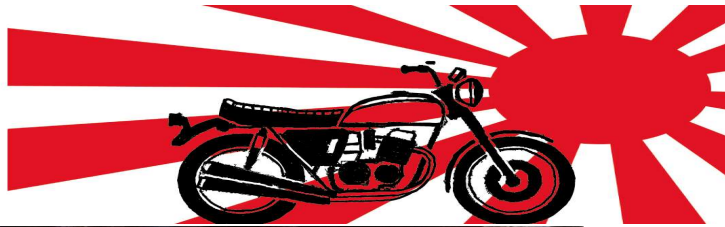
It's recommended that a dry run of the installation be performed first – without thread-locker or epoxies, so you can get a feel for the adjustment and see how the alignment stacks up.

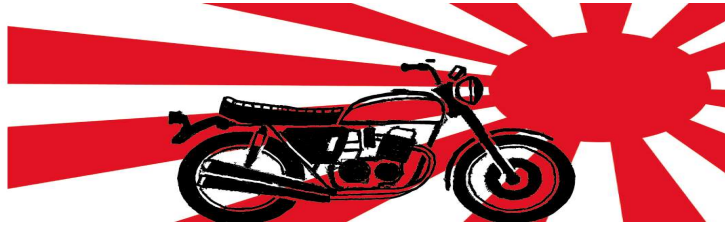
Once you've done the dry run it will only take a few minutes to perform the final installation.

Note that the pictures show the earlier version encased in epoxy – the newer version is not but the process is the same.

Lets begin:

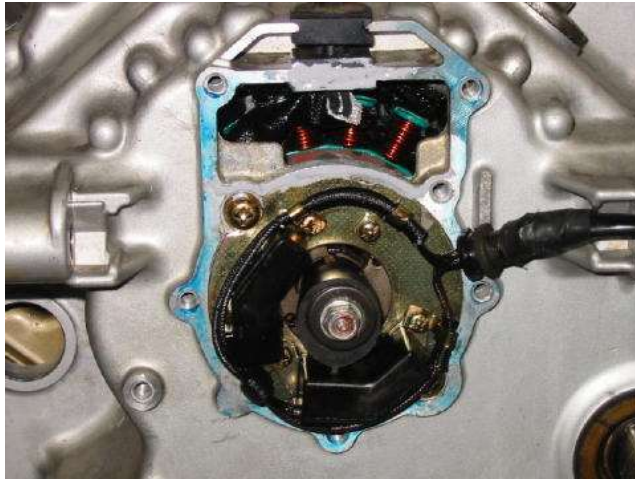






Installation

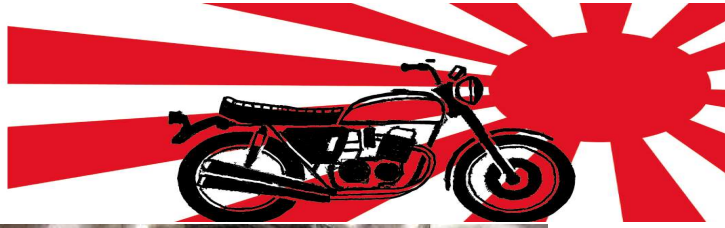
TAI Hall Plate Installation



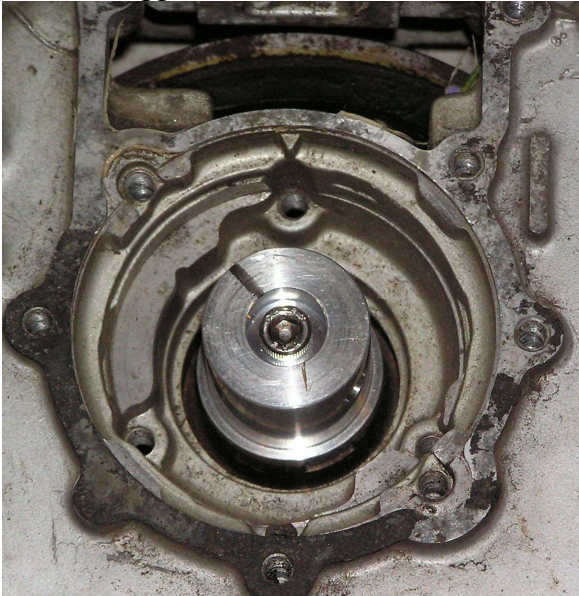
-
- Remove old plate, grommet and wiring



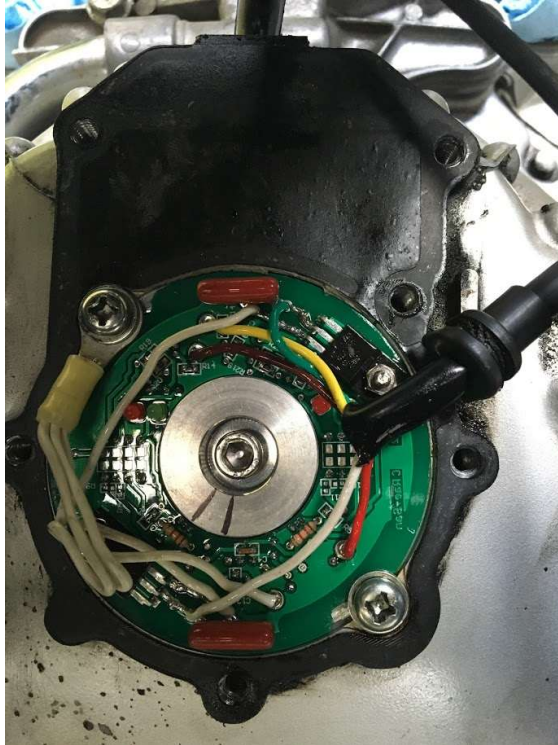
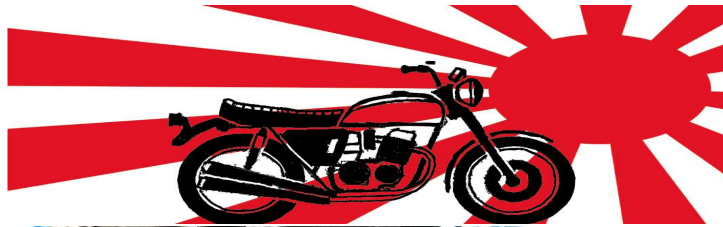
-
- Remove advancer mechanism.



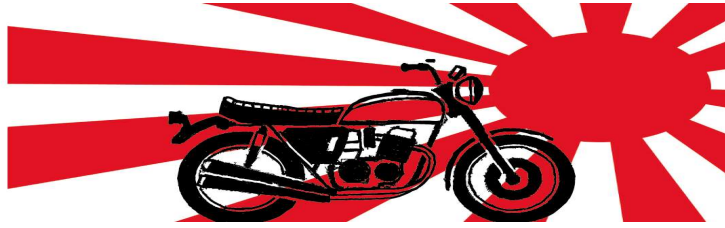
- Put new supplied rotor on the advancer



- Place hall plate in place of the old timing plate

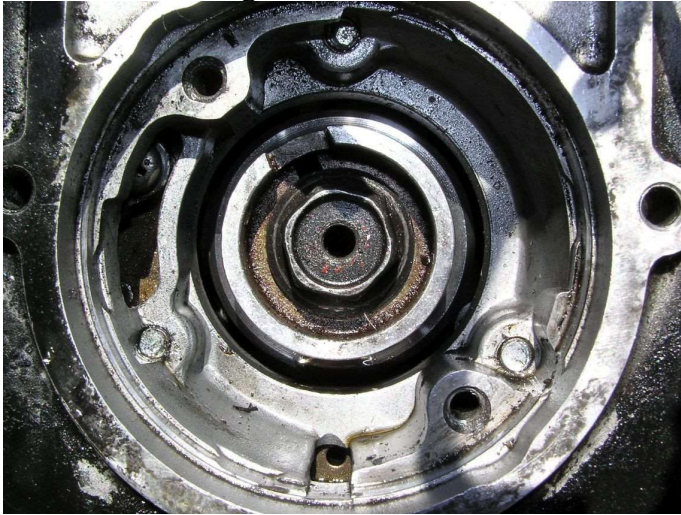


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- Note this is and older board for illustrative purposes
-
- Position the wires out of the way of the spinning rotor and clear of sharp edges on the case.
- Put grommet in the grommet slot in the cover
- Loosely secure the advance assembly with new 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



CDI Hall Plate Installation

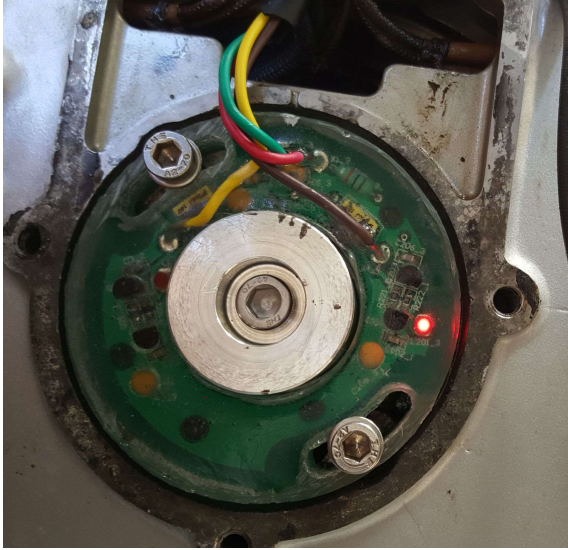
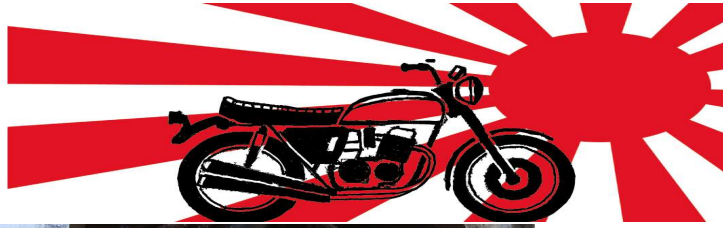
- Remove old plate, grommet and wiring.
- Remove Rotor Magnet



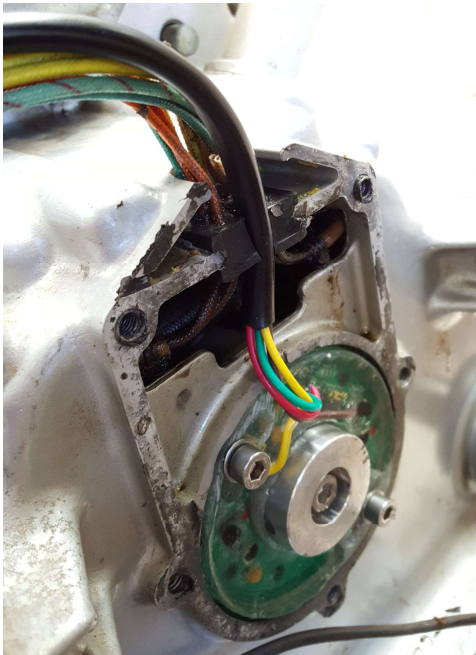
- Put new supplied rotor on the advancer



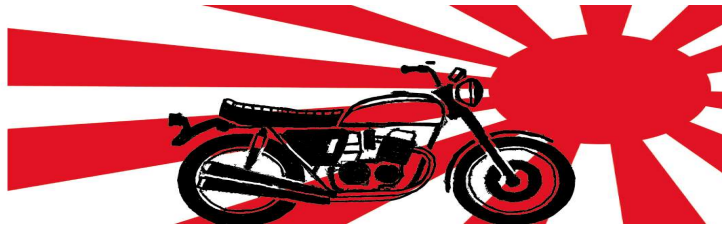
- Place hall plate in place of the old timing plate



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- Position the wires out of the way of the spinning rotor and clear of sharp edges on the case.

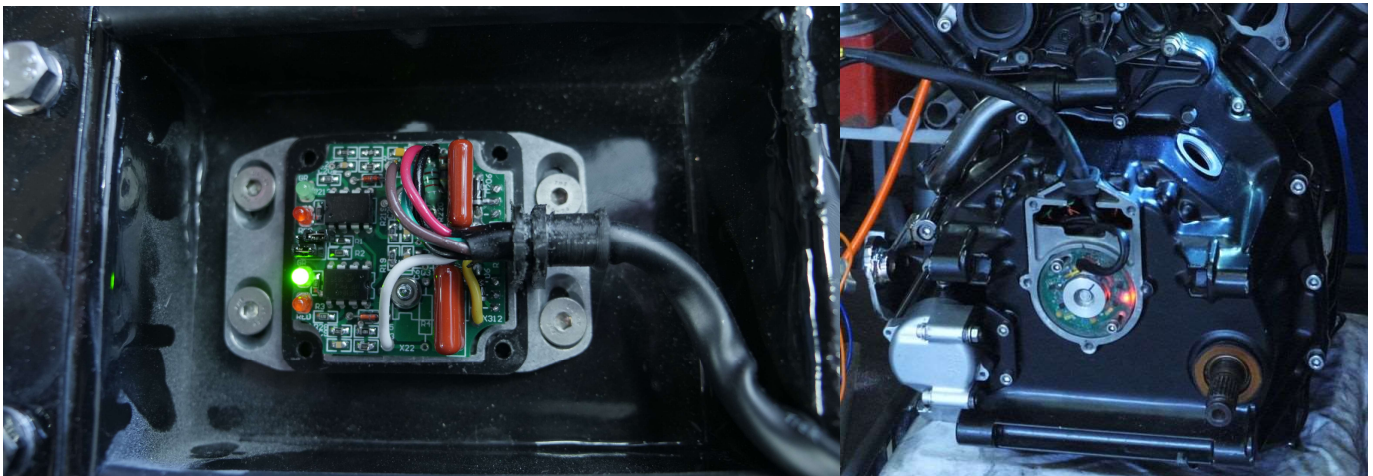


-
- Put grommet in the grommet slot in the cover
- Secure hall plate with screws and nylon washers
- Loosely secure the advance assembly with new rotor as we need to adjust the timing yet.
- Ensure that nothing impinges and that the rotor is centred in the hall plate hole when the engine is rotated by hand.
- **HAMMER FLAT THE STRENGTHENING BRACKET ON THE REAR PLATE PRIOR TO INSTALL TO ENSURE IT DOESN'T IMPINGE UPON THE ROTOR OR HALL PICKUP BOARD.**

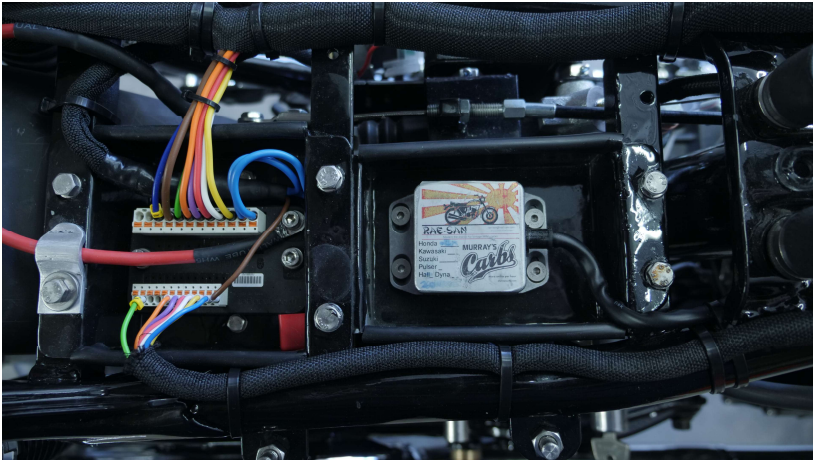
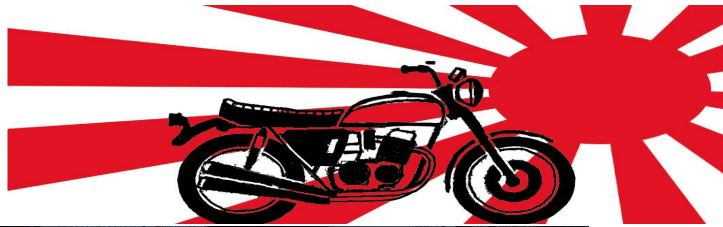


Control Unit Installation and test

- 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.
- Below is a mounting of a controller with a Motogadget controller.
- Second picture shows testing by rotation of the crank.



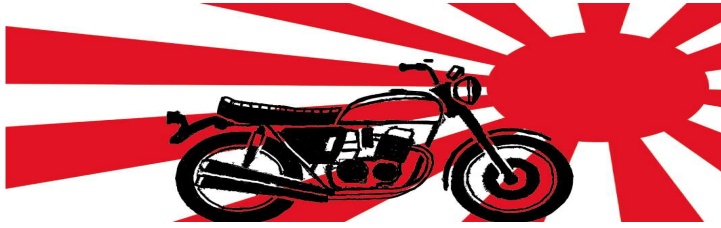
Optional Relay Installation

- 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.
 - Below is shown a Mikes XS 3.0 ohm coil – very similar to the dyna without the branding and price premium....

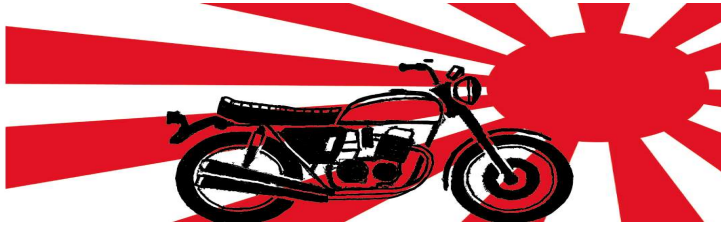




- Coil Pack
 - Mount as per needs – suggestions to come
 - Plug in numbered leads to the appropriate cylinder
 - Run to the coil pack corresponding output – trim to length and re-terminate if required by unscrewing the plug cap – cutting the lead to the desired length and rescrewing the plug cap on – 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.
 -

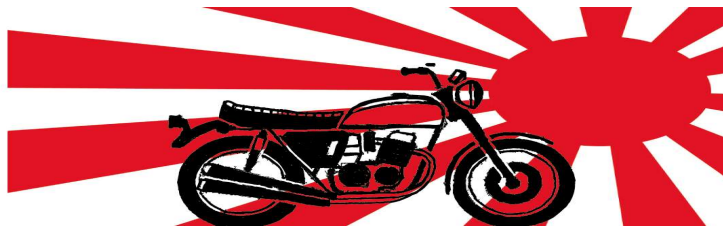
Settings

- 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.**



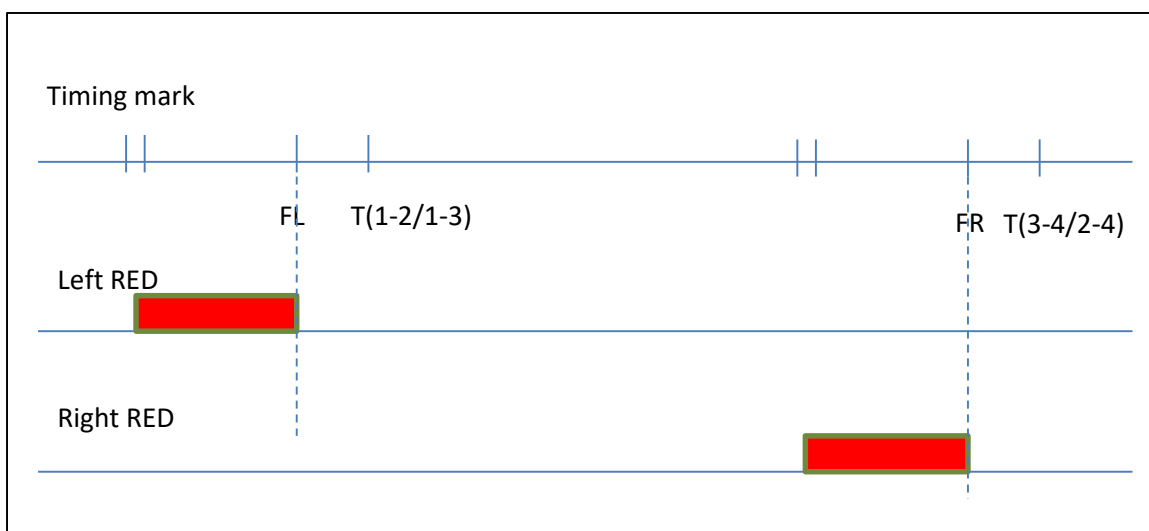
Timing adjustment

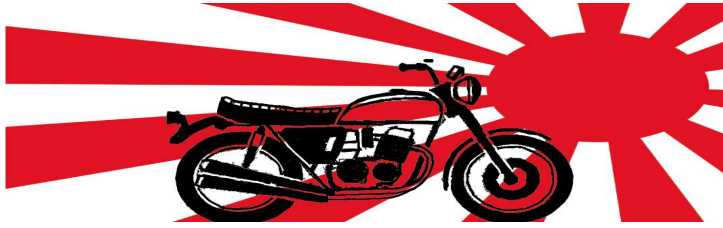
- Loosen the pickup bolts to adjust the timing as the Rotor on the CX is locked in place—
- Set the timing mark to full Left Retard as marked on the flywheel by rotation of the crank.
- Rotate the plate in the opposite direction of engine rotation, until the Left LED turns on.
- Rotating the rotor in the direction of engine rotation 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 Right LED turns off – it should be very close to full retard on Right.
- Ideally the error can be averaged between the two by moving the plate slightly – but for now as long as the error is small it's good enough.
- When tightening the plate bolts – ensure the bolts are only done up enough to securely hold the plate – loctit should be used to ensure they don't vibrate out.
 - 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 could be checked and fine-tuned a little more.

To Summarise:

Rotate the engine and note where the Left and Right 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.

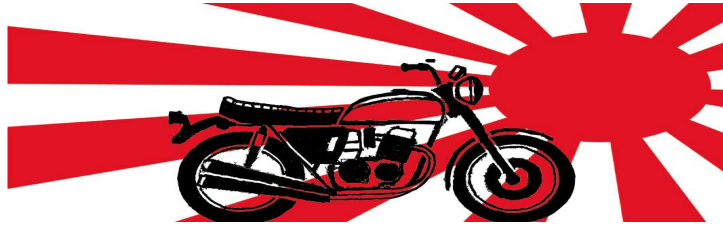




Rotate the engine and check that the turn ON of the RED LED occurs near the Full Advance marks – these are usually a pair of lines || before the | L and I R marks that indicate the stock full advance range.

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

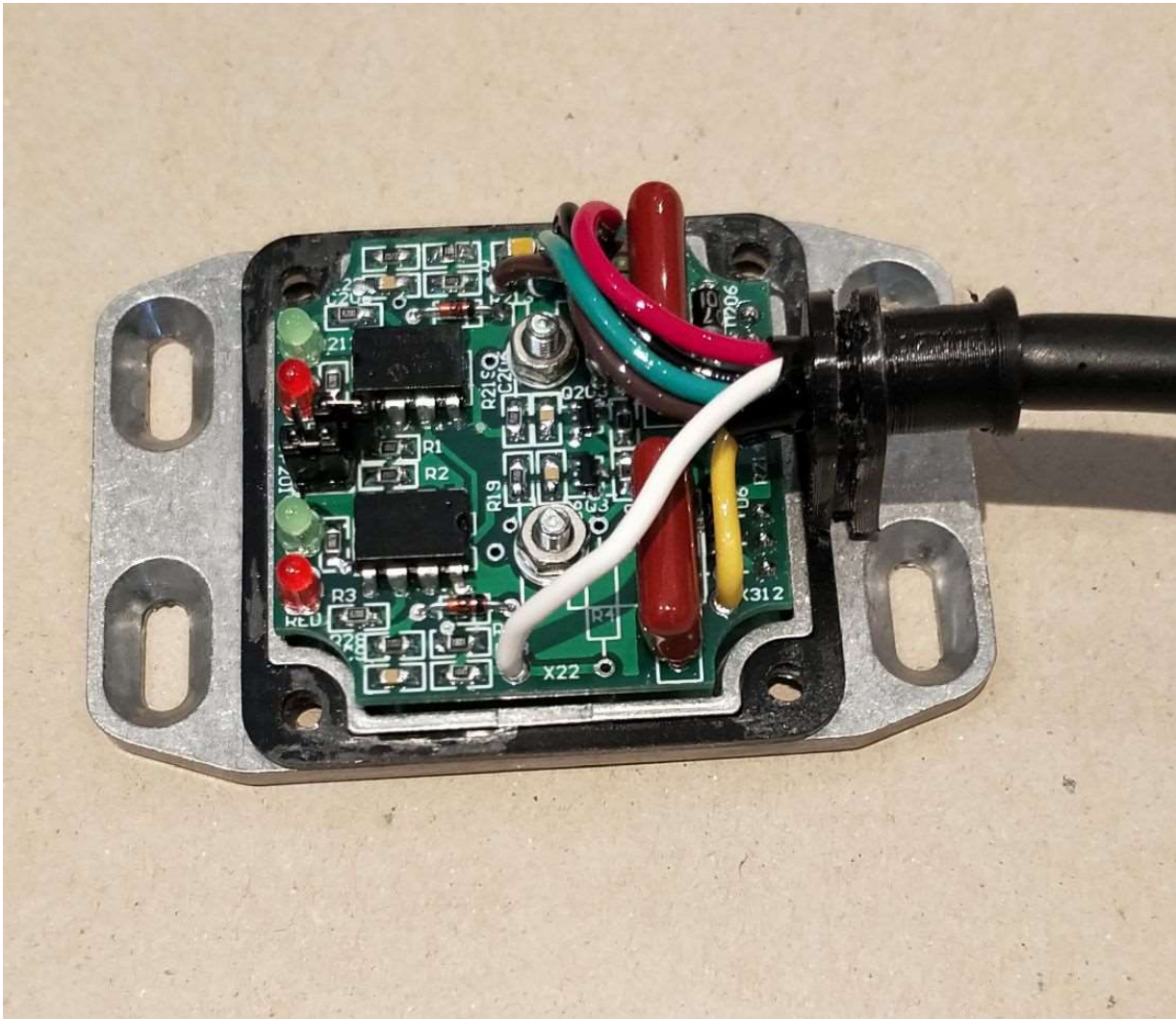
When happy with the location – do the screw (bolt) up snug. And install the covers.



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.

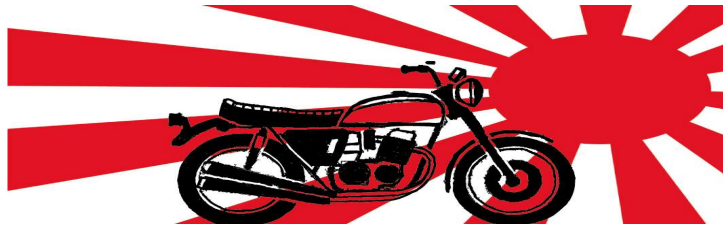
The Rae-San ignition Module contains a small number of configuration options and diagnostic LEDs



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 through to driving one Coil.

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

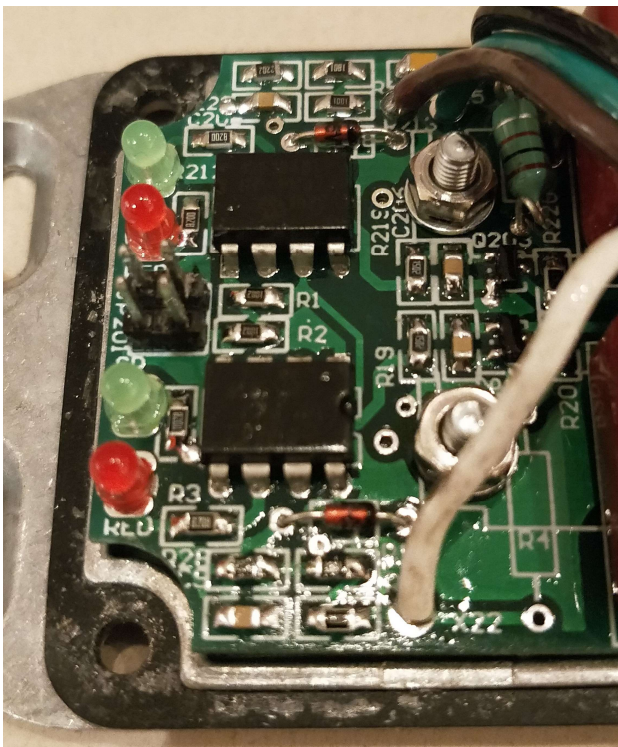


For the TAI version there are 4 ignition timing curves and rev limits that may be selected from on the board.

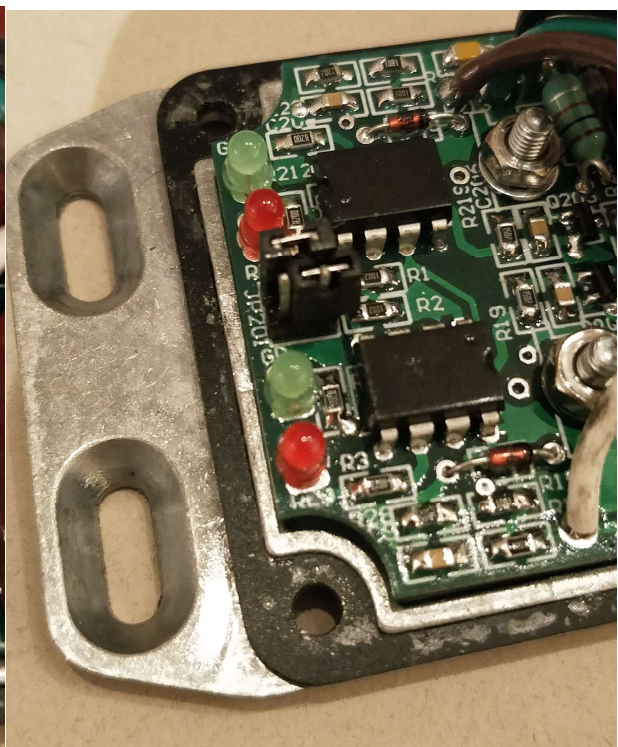
Please refer to the timing sheet at the rear of the document that will have the values programmed for your bike listed against the jumper positions.

Images below illustrate the jumper positions .

POS A

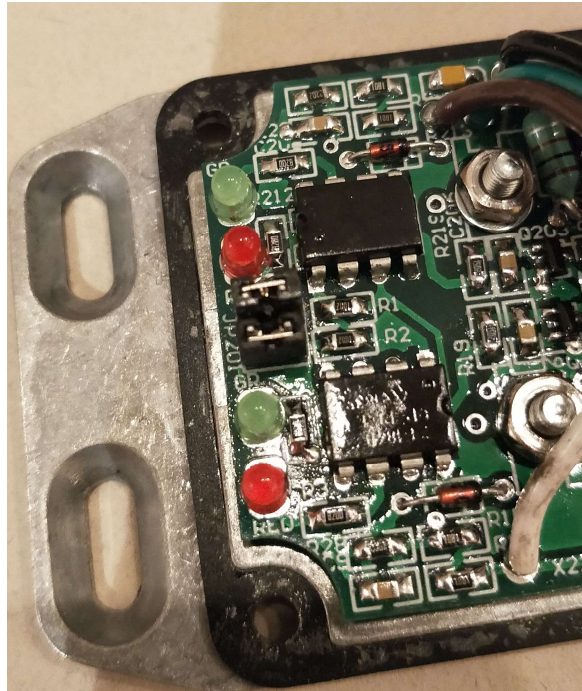
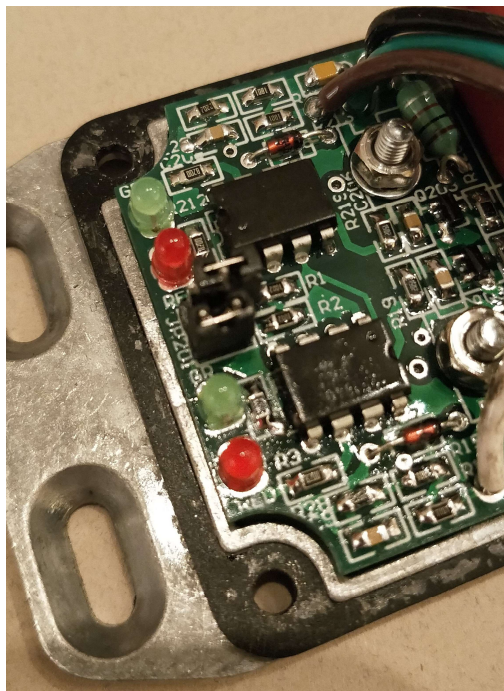
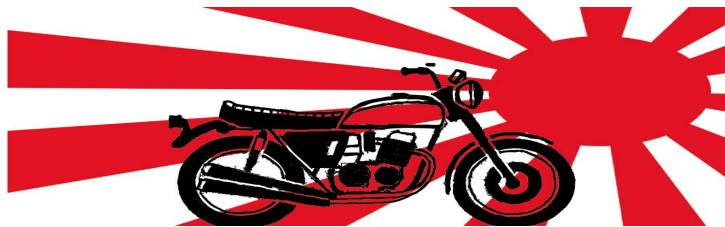


POS B



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.

The HD style Single Fire coil is a very good choice at the standard dwell – its just a bit trickier to mount.

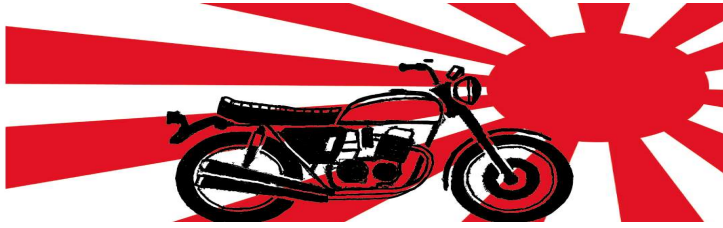
There is a dwell option of 3.5 ms – This is designed to operate with coils that use a somewhat shorter dwell in order to minimise heat generated in the coils.

There is also a 2.0mS dwell version specifically targeted to the use of 1.2 – 1.5 ohm Coil On Plugs – this is not recommended as a standard installation – as COPs are not well suited to wasted spark operation.

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.

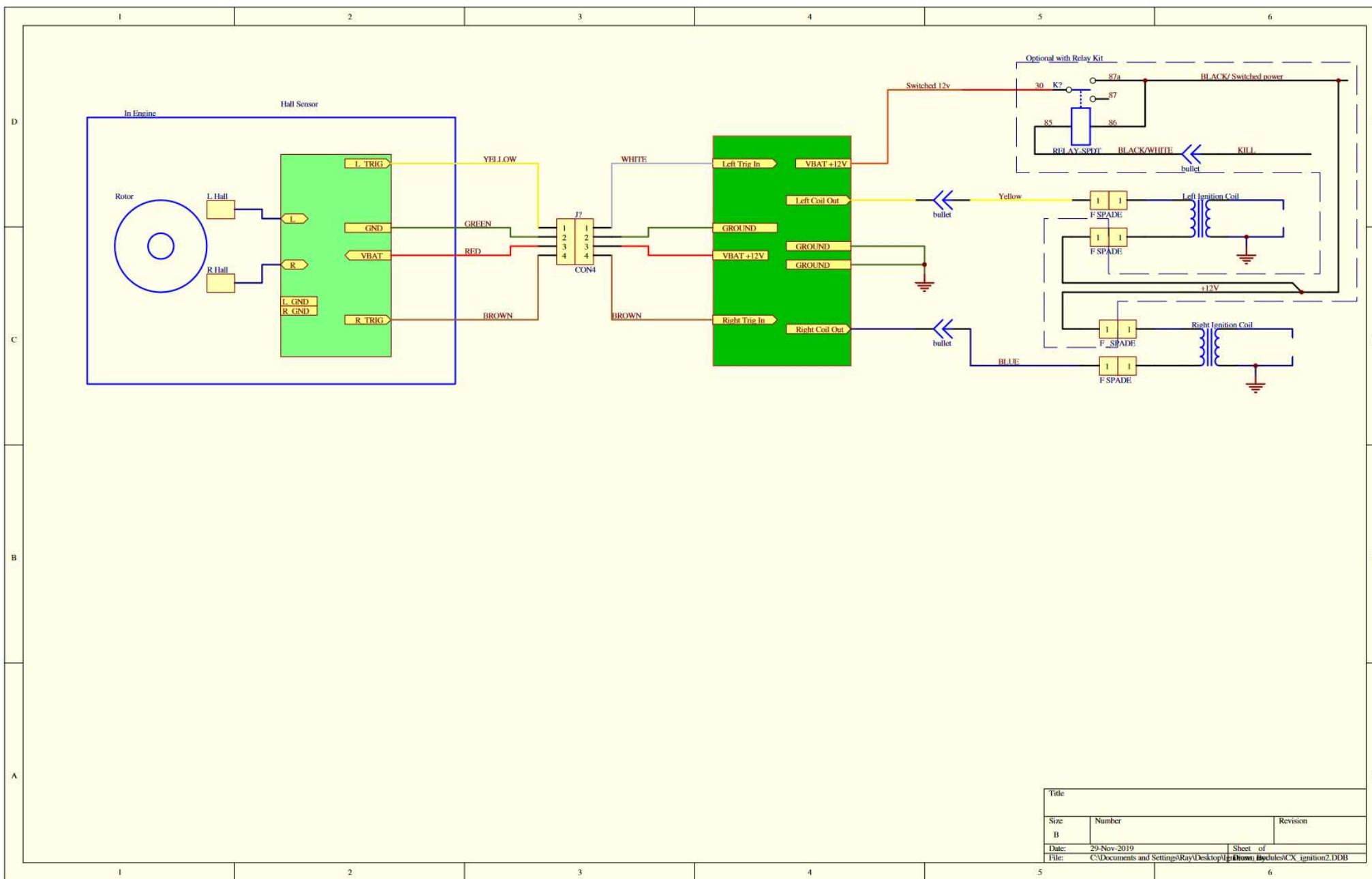
For 4 cylinder engines – dual output coils are used, for 2 cylinder single output coils are needed.

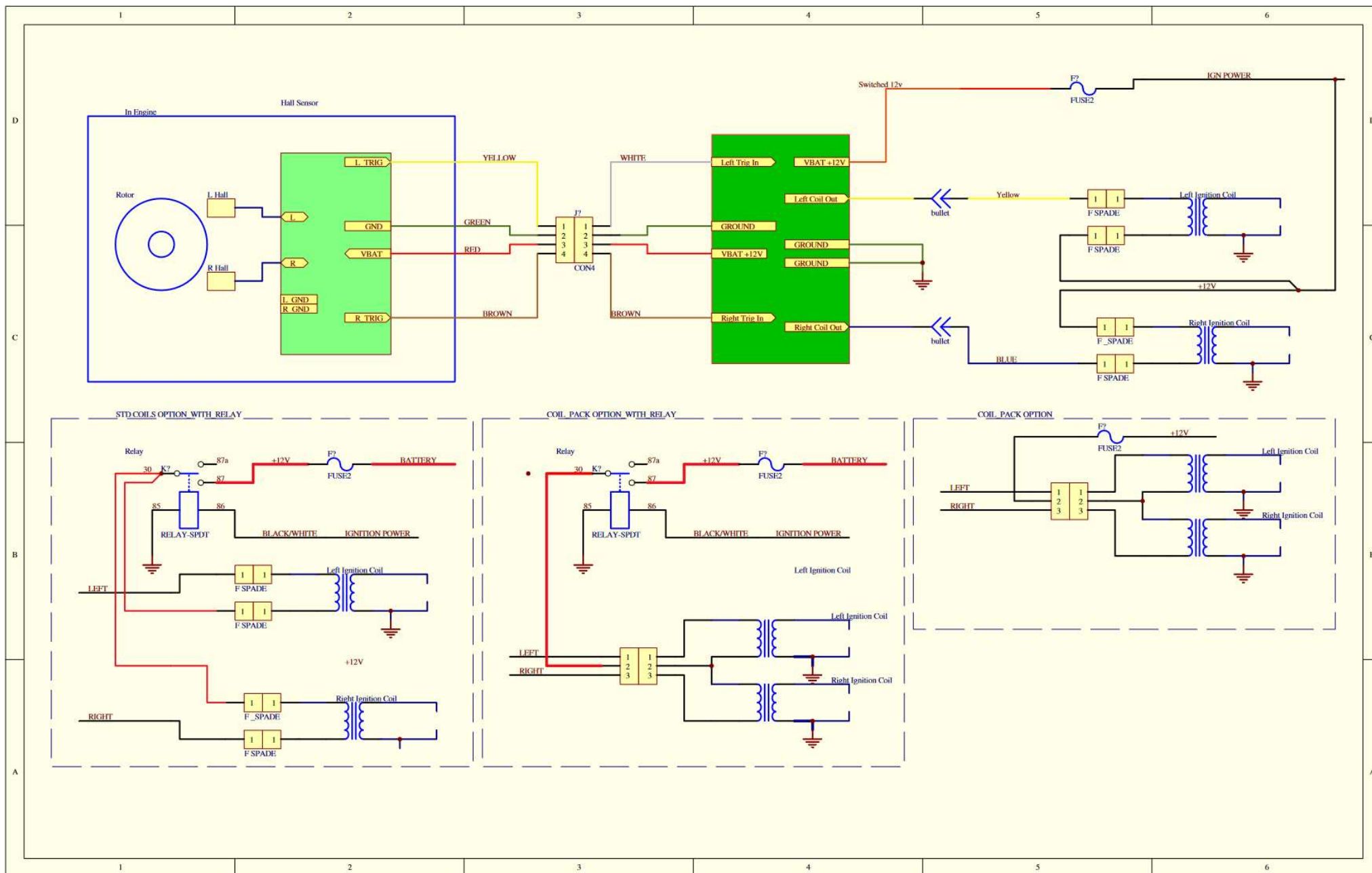
LS2 coils may be used with the Rae-San LS2 Adaptor module.



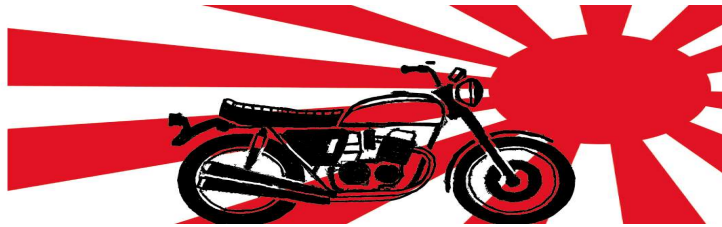
Connections

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.





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MOTORCYCLE PRODUCT DISCLAIMER

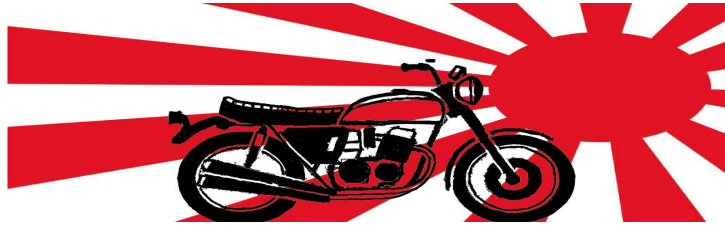
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