

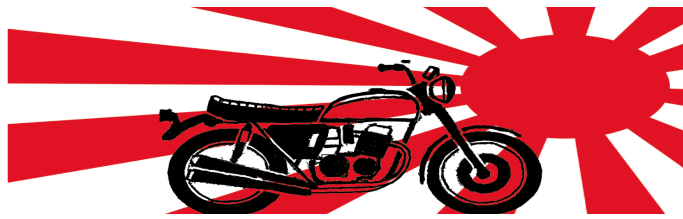
V4.0 DYNA TAI Ignition Module

Installation Manual

DRAFT

Rae-San

12/12/2019



Rae-San V4.0 HALL TAI Ignition Module

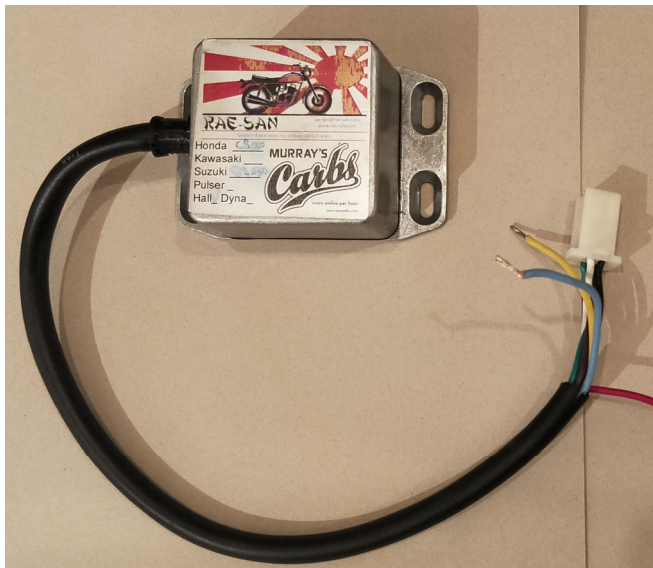
Congratulations on your purchase of a new ignition setup for your motorcycle.

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

The DYNA version of the kit uses the Dyna S trigger plate in a fashion similar to Dynas own dyna 2000 system.

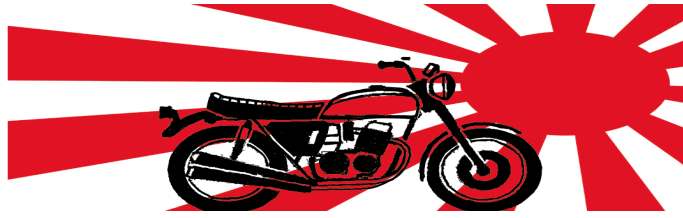
The hall trigger plate is used to generate timing pulses for the Rae-San Ignition controller, which then is used to perform the timing advance electronically and offers additional protections for the coils, which can be prone to heat induced failure if the engine stops in a position where the coil is switched on.

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

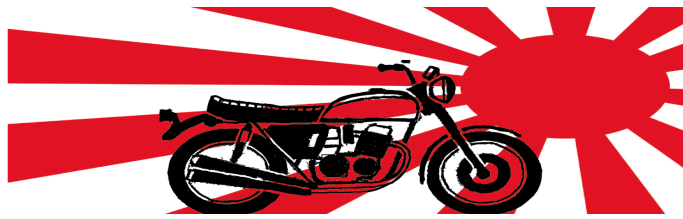


All Rae-San versions have the following features:

- 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

Dyna Hall Plate and Rotor Adjustment

- Reuses the Dyna plate – so only a tweak to the setup is needed.
- Place a Lock/star washer under the rotor bolt to ensure that the rotor will be locked into place.
- Rotate the rotor in the direction of the engine rotation to the fully advanced position.
- Secure the advance assembly with rotor sufficiently to ensure it doesn't spring back to the retard position. Final timing needs to be adjusted yet.

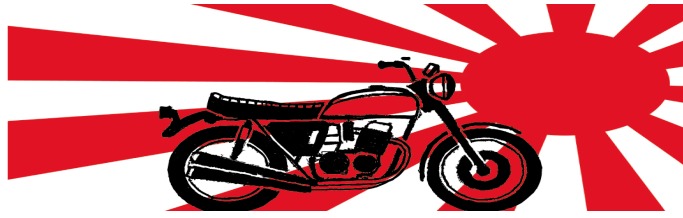
Control Unit Installation and test

- 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 screw connection 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 through 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

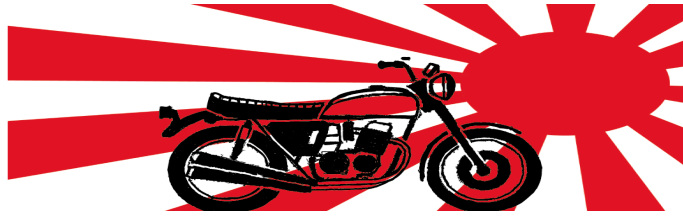
Coils



- 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.
 -

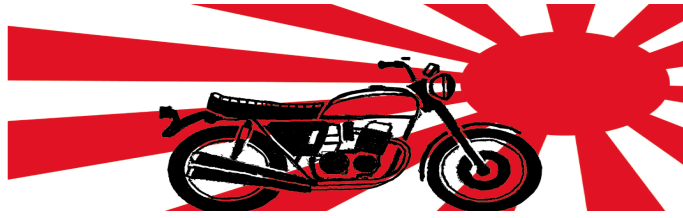
Settings

- 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.**



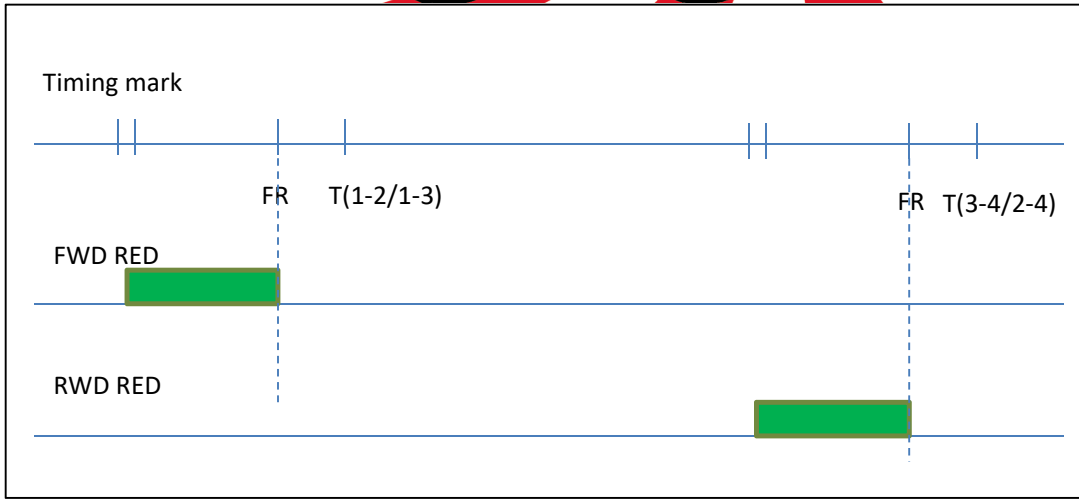
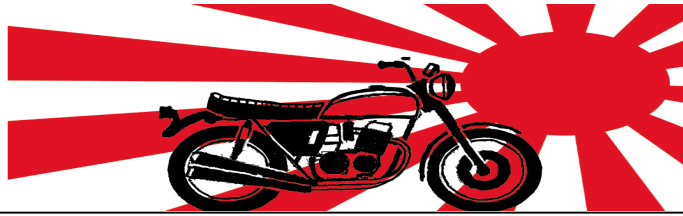
Timing adjustment

- 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 if required.

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.

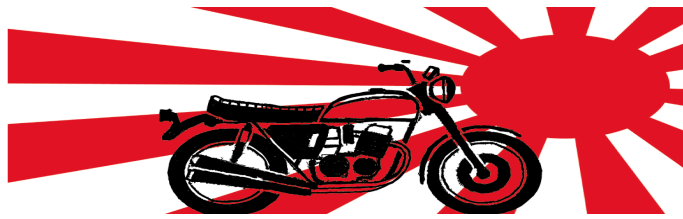
What you are trying to achieve is shown in the diagram below. Where the GREEN blocks show where the GREEN leds would be on. Really we are looking for turn OFF at the FULL RETARD mark as we rotate the engine.



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.

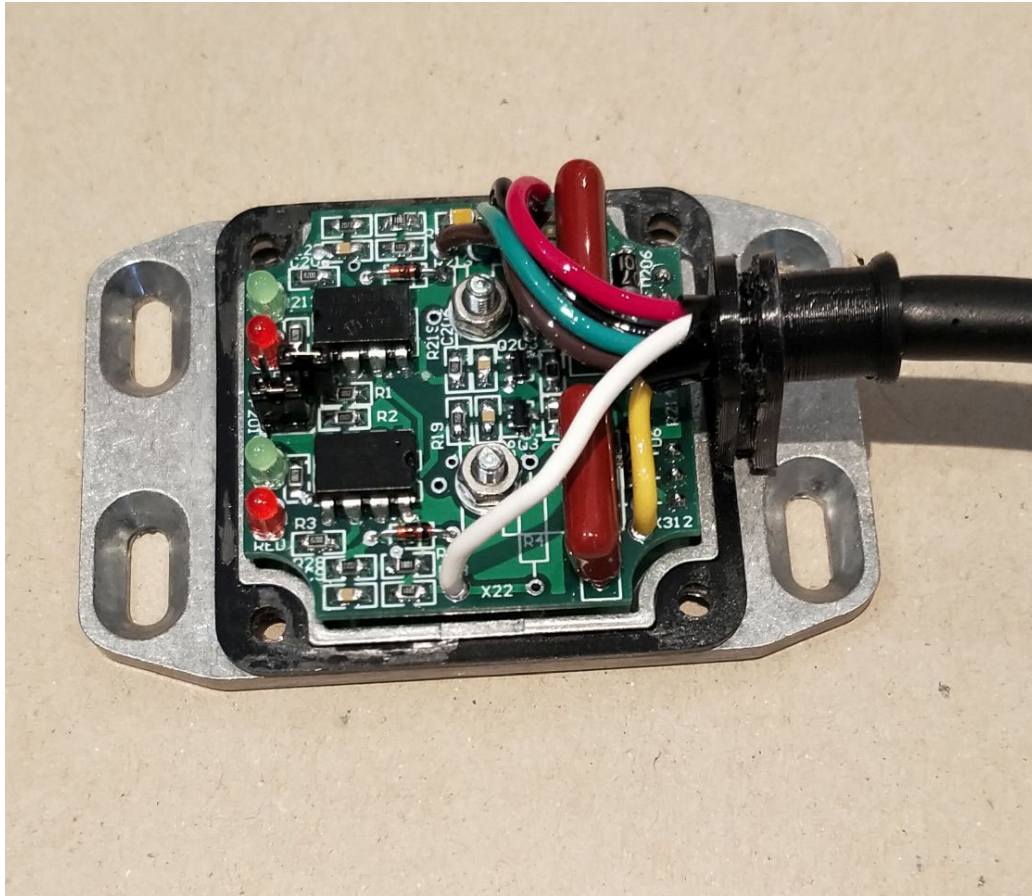
When happy with the location – do the screw (bolt) up snug.



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 LEDES

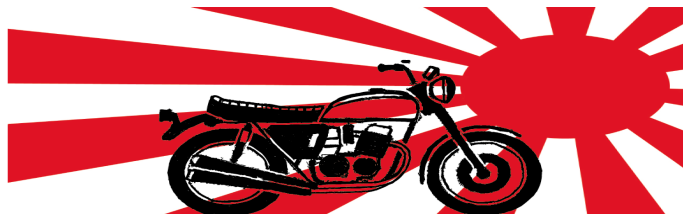


AS can be seen there are two pairs of red and green LEDES at the LHS with a jumper block in between.

A pair of red and green LEDES 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.

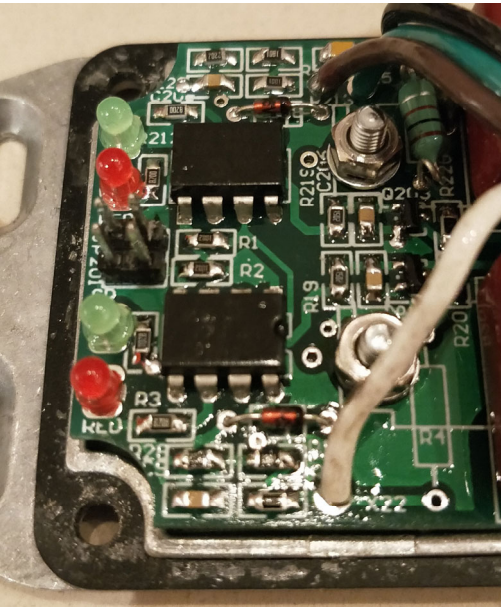
For the TAI version there are 4 ignition timing curves and rev limits that may be selected from on the board.



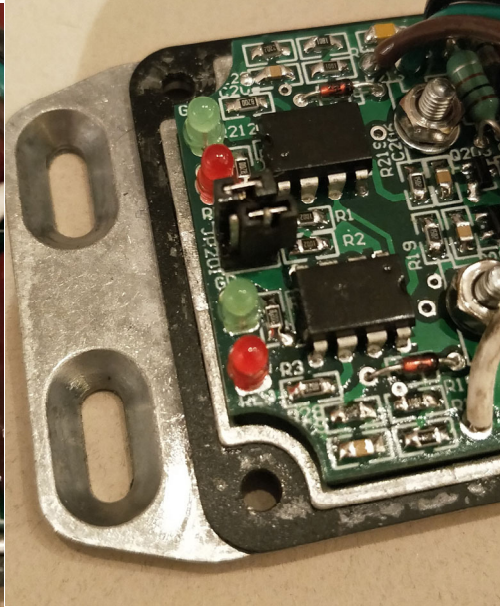
Please refer to the timing sheet at the rear of the document that will have the values programmed for your bike listed against the jumper positions.

Images below illustrate the jumper positions .

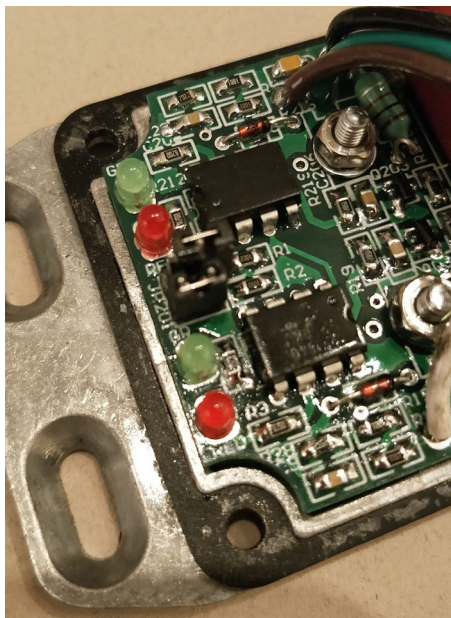
POS A



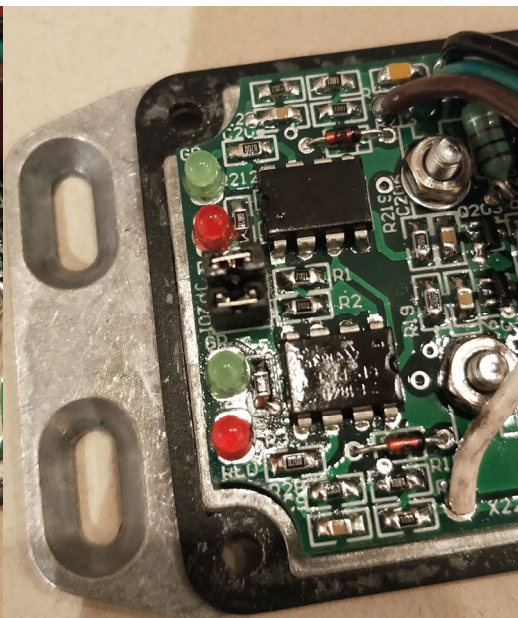
POS B

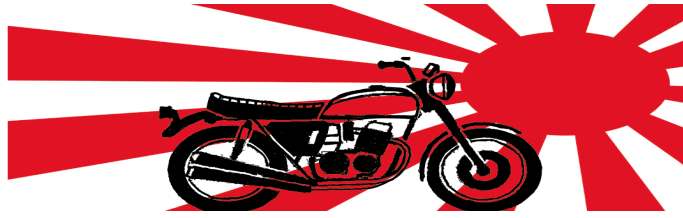


POS C



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.

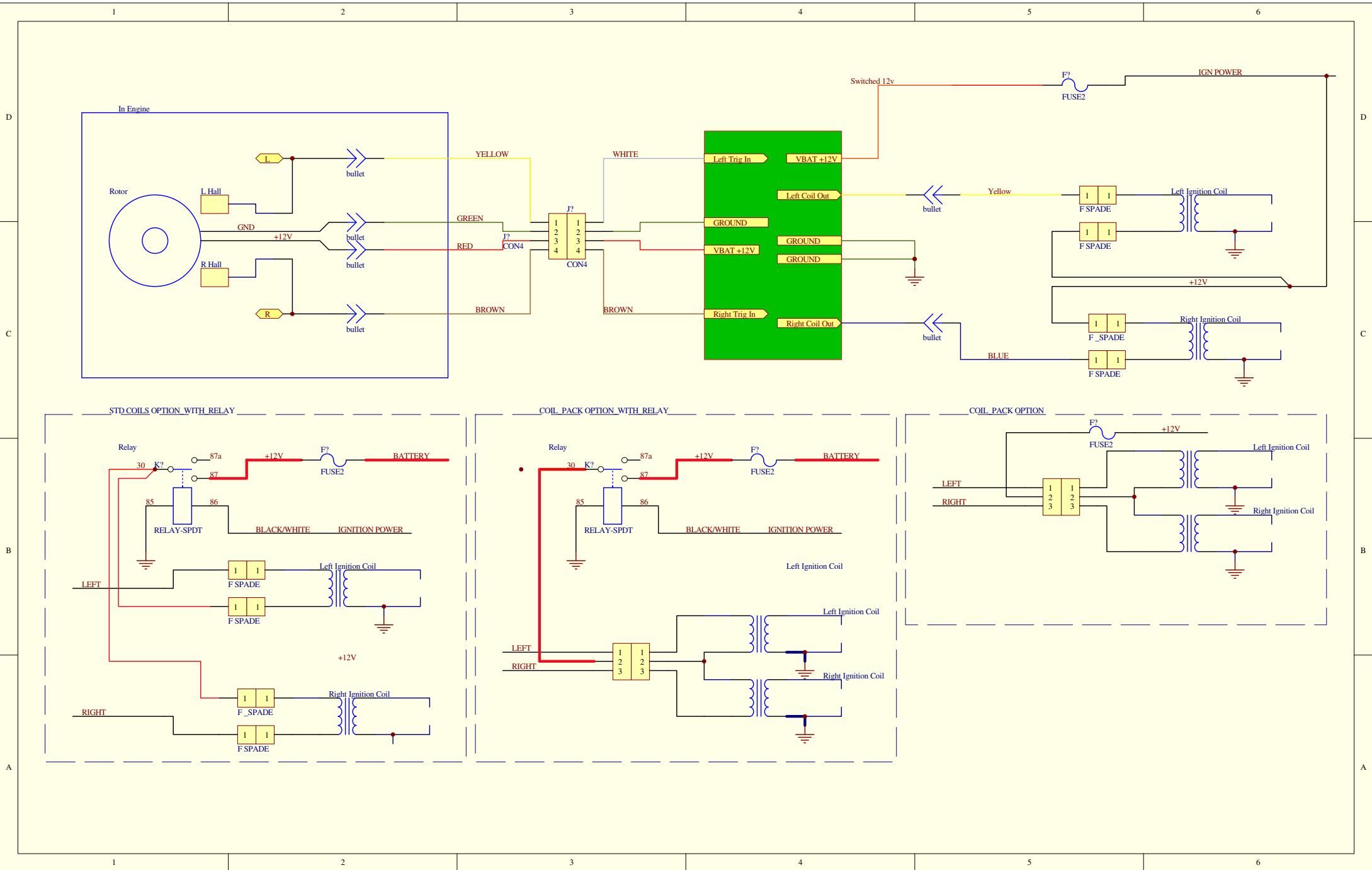
Points type coils have higher resistance and often a series resistor to limit the current. They are not really suitable for a dwell controlled setup – as they will result in a lower spark energy.

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

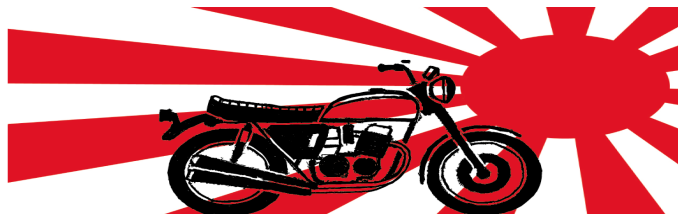
LS2 coils may be used with the Rae-San LS2 Adaptor module.

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.



	base full		stock A				Curve B				Curve C				Curve D			
jumperA				off				ON				off				ON		
jumperB				off				off				ON				ON		
Bike			start	stop	rev limt1	rev 2	start	stop	rev limt1	rev 2	start	stop	rev limt1	rev 2	start	stop	rev limt1	rev 2
HONDA																		
CX 500	10	38	1750	3500	10000	12000	1750	3000	10000	12000	1850	4450	10000	12000	1850	5550	10000	12000
CB400	10	35	1500	2500	9500	11500	1500	2500	10000	12000	1500	2500	10500	12500	1500	2500	11000	13000
CB550	10	35	1200	2400	9500	11500	1200	2400	10000	12000	1200	2400	10500	12500	1200	2400	11000	13000
CB550B	17	37	1500	2500	9500	11500	1500	2500	10000	12000	1500	2500	10500	12500	1500	2500	11000	13000
CB650	10	31	1600	2725	10000	12000	1600	2725	10500	12500	1600	2725	11000	13000	1600	2725	11500	13500
CB5750 SOHC	10	35	1600	2725	10000	12000	1600	2725	10500	12500	1600	2725	11000	13000	1600	2725	11500	13500
CB750 DOHC	10	40	1500	2500	9500	11500	1500	2500	10000	12000	1500	2500	10500	12500	1500	2500	11000	13000
CB900	15	38	1400	3100	9500	11500	1400	3100	10000	12000	1400	3100	10500	12500	1400	3100	11000	13000
CB1100	15	38	1200	3500	9000	11000	1200	3500	9500	11500	1200	3500	10000	12000	1200	3500	10500	12500
KAWASAKI																		
GPZ550																		
KZ650																		
KZ750																		
KZ900																		
KZ1000																		
SUZUKI																		
GS550	17	37																



MOTORCYCLE PRODUCT DISCLAIMER

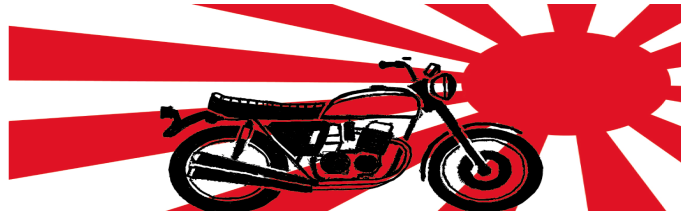
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