

# Tri-Spark Triple Cylinder TRI-0001 Installation Notes

V5 Updated Nov. 2020



Thank you for purchasing the Tri-Spark TRI-0001 system for your triple. This system suits the BSA Rocket 3, Triumph Trident T150 and T160 models made from 1969 to 1975.

The installation requires a good knowledge of how to dismantle and reassemble the various components and most importantly the ability to make solid electrical connections. **Consider getting expert assistance with the installation if you lack the necessary tools and skills.**

Warning: There are **potentially lethal high voltages** produced at the ignition coils and spark plugs, therefore every precaution must be taken to prevent injury.

## **Step 1: Preparation. The installation should take about 2 to 3 hours**

Read the installation instructions and troubleshooting guide thoroughly before proceeding. **Remove the fuse and disconnect the battery.** Remove the seat, side cover, points cover, spark plugs, patent plate (Triumph: triangular plate in centre of timing cover BSA: round cover), spark timing hole access bolt and rocker covers.

**Caution: Do not reconnect the battery until the installation is complete, all wiring has been double checked and all unused wires have been disconnected or removed.**

## **Step 2: Remove the points base plate and auto advance unit.**

The points plate should be removed along with the associated wiring. The auto advance unit is then removed using the Triumph/BSA service tool 61- 0782 or by threading in a correct sized bolt and giving this bolt a tap or by inserting a steel rod and gentle tapping it around until the auto advance unit drops off its taper. It may be a tight fit. If you are replacing another electronic ignition system, remove those components now.

### Step 3: Rotate engine to correct timing position. Install Tri-Spark rotor and sensor plate.

Select high gear so that the rear wheel can be used to rotate the crankshaft. Rotate the crank forward until top dead centre (TDC) is located on the number 1 (timing side) cylinder on the compression stroke. At TDC on compression, both valves should be closed with clearance on both valve adjusters.

With the timing plunger screwed into the access hole in the front of the engine, apply light finger pressure on the plunger while slowly rotating the engine backward until the timing plunger engages in the crankshaft. The "A" or "B" timing line (whichever is correct for your engine) should now line up with the pointer in the strobe timing port as shown here. If the plunger is not available simply rotate the engine backwards from TDC until the first timing mark lines up with the pointer. In most cases this mark will have a "B" stamped next to it unless you have an early model engine or crankshaft. The crankshaft should now be at 38 degrees BTDC relative to the timing side cylinder on the compression stroke.



Fit the Tri-Spark rotor as shown here and tighten with the socket head cap screw and washer provided. There should be a 9 to 11mm gap between the right edge of the rotor tab and the casting as shown.

To reposition the rotor if required - first remove the retaining bolt, then simply insert the M8 (8mm thread) bolt supplied and tighten. This will easily pull the rotor off the taper joint.

**Caution: Do not attempt to remove or rotate the rotor by pulling on the tab.**



Using the plastic strip provided check for a 2 -3 mm air gap between the top of the rotor tab and the strip as shown here. **This gap is critical.** A smaller gap will result in damage to the rotor and sensors. As a guide, the thickness of the strip is 2mm. Increase the gap if required by filing the tab or adjusting the taper.



Feed the free end of the cable attached to the sensor plate through the hole in the bottom of the points cavity where the points wiring was originally located.

Locate the sensor plate as shown here. Use three washers (provided) per pillar bolt to adjust for the difference in thickness from the original points plate.

Apply some silicone between the wire and the pillar bolt at the end of the installation to prevent any chafing.





Fit the Sensor Plate using the original pillar bolts but do not tighten yet as it will be adjusted later during strobe timing. The positioning of the sensor plate is approximate at this stage as it will be adjusted later on when strobe timing. Use the LED as shown in step 6 to adjust the position of the sensor plate for more accuracy. You can do this after the wiring is connected in step 5.

#### Step 4 - Choose a location for the Tri-Spark control box

Find a protected location where the box can be fitted securely and out of the way. Possible locations include under the seat or behind the side cover.

Use the flanges on the trigger box (carefully) to hold it in place. As a precaution, you may wish to mount the box on some foam rubber to reduce vibration. Adhesive Velcro tape also works to hold the box in place.

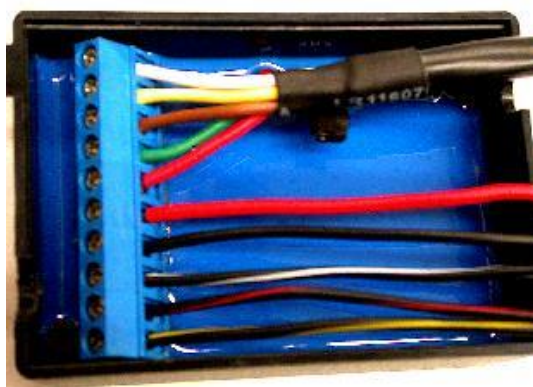
#### Step 5 - Connect the wiring to the Tri-Spark trigger box



Disconnect wiring to condensers, isolate and remove the condensers. Disconnect the wiring to the ignition coils and isolate.

Run the cable from the sensor plate along the frame under the engine away from the exhaust system and then up the central post to the trigger box location under the seat or behind the side cover. Fix the cable in place with the black cable ties supplied.

Cut the sensor cable to the required length to reach the box with some slack for routing the cable and future adjustment.



Connect the cable from the sensor plate to the control box as shown here. Also connect the wiring from the box to the ignition coils and wiring harness as shown in the following photo and wiring diagrams on page 6.

Notice that the fuse is in the negative power feed to the box in the positive earth/ground installation. This is unconventional in electronics but in this situation it protects best against faults in the coils and motorcycle wiring. If the fuse blows, check that the coils' primary windings are not shorted and that there are no short circuits to the frame in the coil connections to the control box.

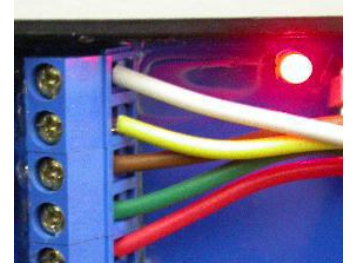
Double check all wiring paying particular attention to the coil connections as they are not interchangeable. The engine will not run if any of the coil connections or HT leads are swapped. Wires and cables should be secured well away from the exhaust pipes and moving parts of the bike. Avoid running the sensor plate cable near to the high tension spark plug leads.

Once all the wiring up has been completed and the unused wires removed or made safe, the fuse and battery may be reconnected.

## Step 6 – Set the timing statically using the LED as a guide.

Inside the trigger box there is a LED which can be used to check the operation of the system in several ways.

1 - To set the static timing, first rotate the engine to the correct timing position as per step 3 instructions. Then rotate the sensor plate back and forth on its slots with the pillar bolts loosened off, to a position where the LED just switches on and off. This will be very close to the correct timing for the engine, ready for checking with a strobe light.



2 - Additionally, the LED can be used to check the sensor plate operation as follows. With the sensor plate removed from the engine to gain access to the sensors, a thin steel object inserted in the sensor slot should make the LED come on. It must be a steel object such as a hacksaw blade (not stainless steel or any other metal). This is an easy way to check that all 3 of the sensors are operating.

3 - The LED should normally blink at a steady rate when the engine is idling.

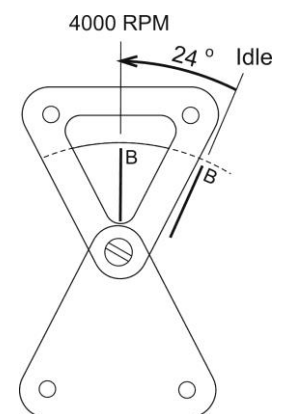
4 – When the engine is stopped, the LED should appear to pulse every few seconds. If the LED can be made to operate as described, it means that there is power to the box and that the microprocessor is running normally.

## Step 7 - Start the engine and check the timing with a strobe light.

You must check the operation of the ignition system with a strobe light to be certain of the timing. Running the engine with the timing out of adjustment can harm the engine.

Install and connect the spark plugs and high tension leads. Make sure the leads are connected to the correct spark plug. Start and warm up the engine briefly. Switch on the strobe light and aim the light at the strobe timing port.

As shown here the timing mark should appear to line up exactly with the pointer when the engine is running at 4000 RPM. At Idle the mark should move out of view to the right side of the strobe timing port. The mark should move smoothly into view as the revs are increased.



If required, the timing can be adjusted by rotating the sensor plate on its slotted holes. Moving the sensor plate anti-clockwise advances the ignition timing. If the adjustment slot range is insufficient to achieve the timing as described above, you may need to check and adjust the installation of the Tri-Spark rotor.

**TIP:** Rather than trying to move the sensor plate with the engine running, mark the location with a pen and adjust according to the mark with the engine stopped. Remember a 1 degree change to the sensor plate makes a 2 degree adjustment at the crankshaft. Use small adjustments and recheck with the strobe as above.

Repeat the strobe test on other two cylinders as a final check that everything is working correctly. If a small variation in timing between cylinders is noticed, make the final timing adjustment on the most advanced cylinder.

Finally, tighten up the pillar bolts (easy does it) and replace the covers. That's the job done.

## Other installation notes

**Important:** You must use suppressor type spark plug caps with 5k resistance OR suppressor type spark plug leads (carbon fibre) OR resistor type spark plugs. Misfiring or cutting out will result if the suppression is not fitted.

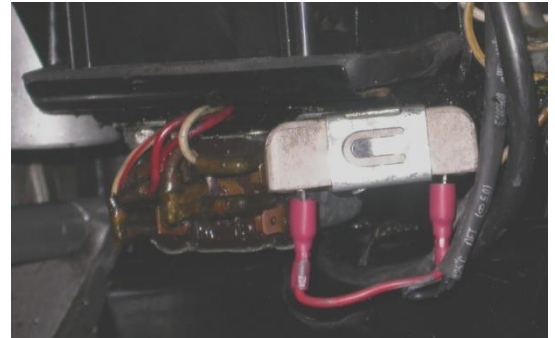
The system can be installed for positive or negative earth/ground wiring. These motorcycles were originally wired for positive earth. Unless your machine has been rewired for negative earth you should use the positive earth wiring diagram. We do not recommend changing the wiring from positive to negative earth as there is no practical improvement and it could cause confusion in the future.

## Installation for 6 volt coils

The installation with 6 volt coils is slightly different than for 12 volt coils. You will need to install a ballast resistor as shown in the wiring diagrams. The ballast resistor can be the same type as used on a T160 or equivalent automotive type so long as it is 1.6 Ohms. We can supply a ballast resistor ordered separately.

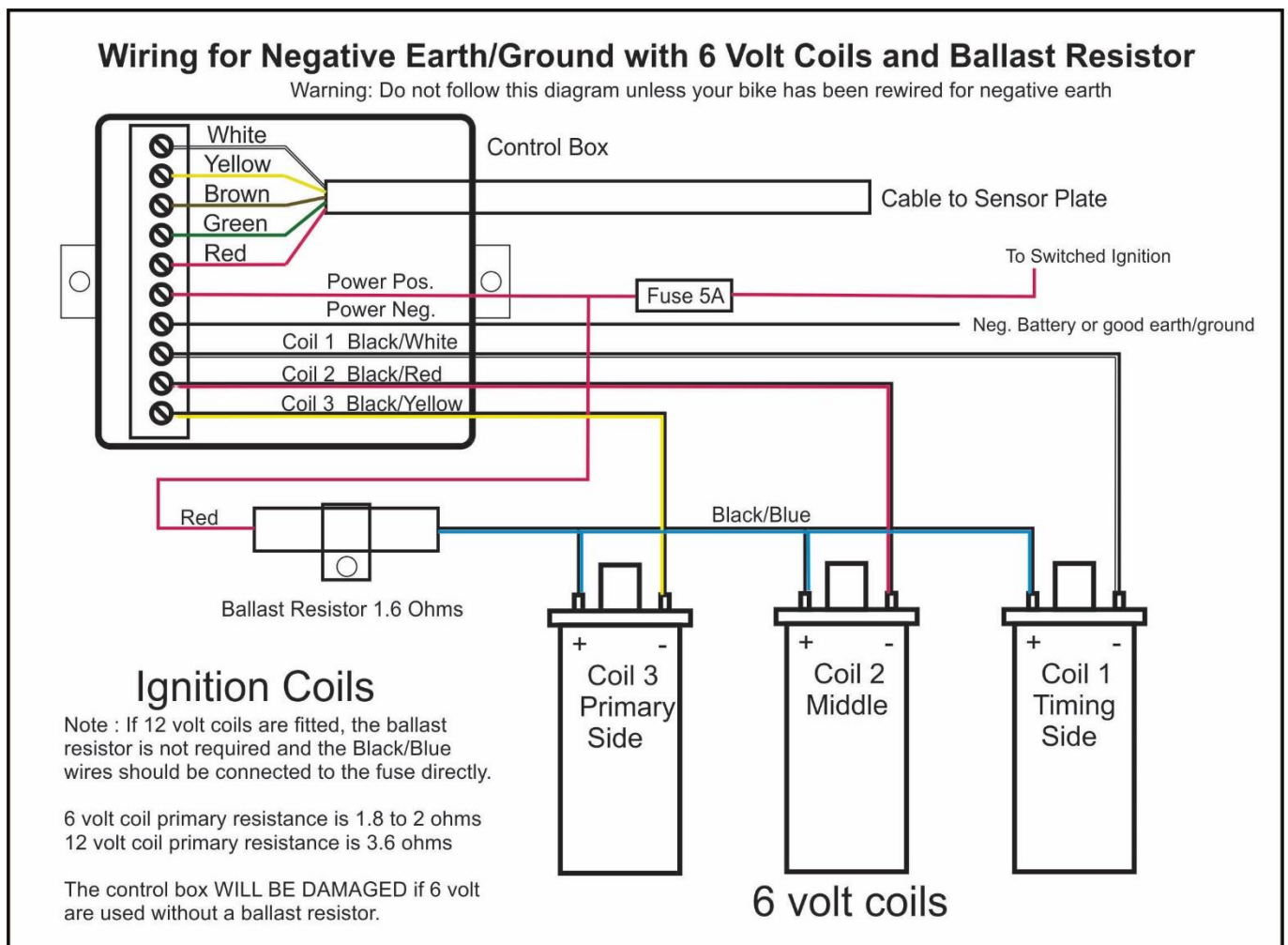
**IMPORTANT!** The wiring of the resistor as originally fitted on the T160 is NOT correct for the Tri-Spark. You must remove the original wires from the resistor and rewire it as shown in the wiring diagram. FAILURE TO DO SO WILL DAMAGE the system!

This photo shows the typical installation of the ballast resistor under the battery carrier.

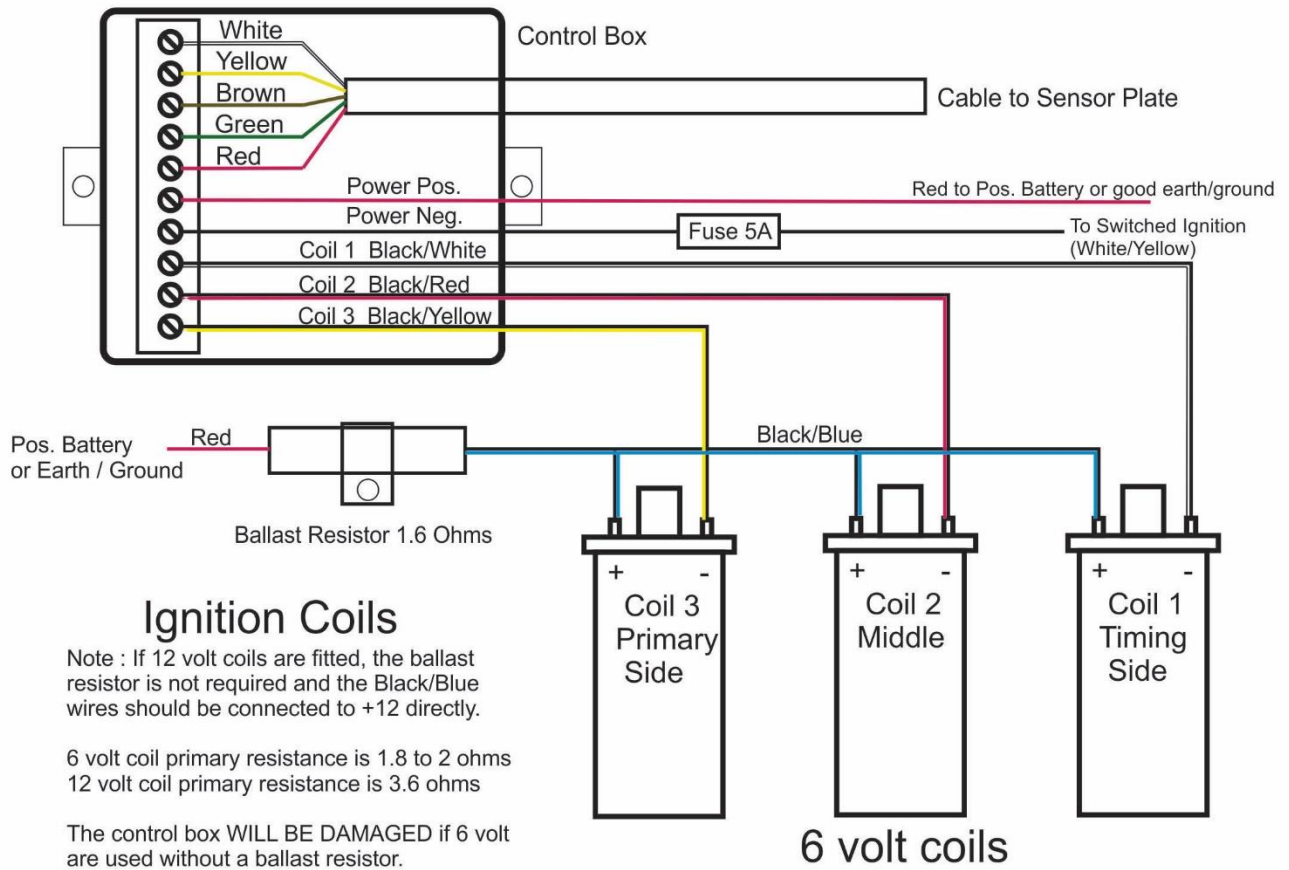


Use the appropriate wiring diagram on the next page (6) if your machine has the original positive earth wiring installed.

Use this diagram **ONLY** if your machine has been converted to negative earth/ground.



## Wiring for Positive Earth/Ground with 6 Volt Coils and Ballast Resistor



## Wiring for Positive Earth/Ground with 12 Volt Coils

