

Tri-Spark Ignition System Installation

Triple Cylinder

Who should do the installation? – We recommend that you have a bike electrician do the installation. If you are at all unsure about doing the installation, consider getting expert help. There are **potentially lethal high voltages** produced at the ignition coils and spark plugs, therefore every precaution needs to be taken.

What do you need to do it yourself?

A good set of tools, knowledge of how to dismantle and reassemble the various components and most importantly, be able to make sound electrical connections. Twisting wires together and putting tape on them will probably leave you at the side of the road making phone calls! It's worth getting expert assistance with wiring.

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

Review installation instructions; **remove fuse or disconnect the battery**, seat, side cover, points cover, spark plugs, patent plate (triangular plate in centre of timing cover), blanking plug to spark timing hole, 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 original points base plate and auto advance unit.

The points plate is retained by the 3 pillar bolts. The wiring to the points plate should be disconnect from the points, then pulled out of the engine and isolated (taped up out of the way) or completely removed (preferable). The auto advance unit is removed by 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 it's taper. It may be a tight fit requiring the service tool for removal.

Step 3 - Rotate engine to correct position, then install Tri-Spark rotor and sensor plate.

Put the bike in high gear so that the rear wheel can be used to rotate the engine. Rotate engine forward until top dead centre (TDC) is located on the number 1 (timing side) cylinder. At TDC both valves are closed and there is clearance on both valve adjusters.

With the timing plunger screwed into the blanking hole in the front of the engine, apply light finger pressure while slowly rotating the engine backward until the timing plunger engages in the crankshaft or until the "A" or "B" timing line (whichever is correct for your engine) is seen to line up with the pointer in the strobe timing port. If the plunger is not used for this, look for the drilling in the crank through the access hole to be certain of the rotation. Once the plunger is located in the crank, the strobe timing pointer should line up with a timing line which should help you determine if your machine is timed to the A or B marks.

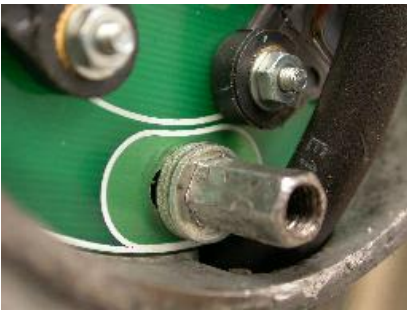


Fit the Tri-spark rotor as shown in the above photo and tighten with the socket head bolt and washer supplied. Be certain that the rotor is located correctly, there should be a 9 to 11mm gap between the edge of the rotor and the casting as shown above.

If you need to remove the Tri-Spark rotor to reposition it, after first removing the retaining bolt, 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. This will not work as the tab will simply bend. Please use the M8 bolt as a puller.

Feed the free end of the cable attached to the sensor plate through the hole in the bottom of the points cavity where the old wires were removed from. Take care to feed the last of the cable through carefully as it has a heat protective cover and is slightly stiff.



Use the washers provided to space out the pillar bolts. Watch for contact here. Apply some silicone between the wire and the pillar bolt at the end of the installation to stop any chaffing.



....Notice the orientation of the circuit board

Fit the Sensor Plate using the original pillar bolts but do not tighten yet. Rotate the sensor plate until the edge of the rotor can be seen to line up through the timing hole in the sensor plate as shown in the photo below. The rotor should be halfway across the timing hole and coming in from the left. Tighten it lightly as it will need to be rotated later during strobe timing and finally tightened then. Lightly sand the edges of the stator unit if it fits too tightly to rotate easily with the pillar bolts loosened.

Refit spark timing blanking bolt.



Step 4 - Choose a location for the Tri-spark trigger box where it's protected and can be fitted securely out of the way.

Possible locations for the trigger unit include under the seat, behind the side cover or under the battery box.

The unit can be mounted using the lugs on the trigger box or by wrapping a long cable tie around the unit to hold it in place. As a precaution, you may wish to mount the box on some rubber to cut down on vibration.

Step 5 - Connecting the wiring to the Tri-Spark trigger box

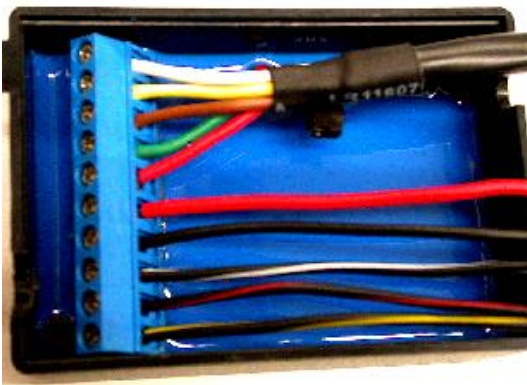
Disconnect wiring to condensers, isolate and remove the condensers. Disconnect wiring to the ignition coils and isolate.

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

Connect wiring from sensor plate to trigger box as shown below.



Connect wiring from the trigger box to ignition coils and wiring harness. Fit cover on Tri-Spark trigger box and fix in position. Connect the wiring as shown in the following photo and wiring diagram (see below).



Notice that the fuse is in the negative power lead to the box (positive ground installation). This is unconventional in electronics but this way it protects to output transistors best against faults in the coils and wiring. If the fuse blows, check that the coils are not shorted in the primary and that there are no short circuits to the frame in the coil connections from the trigger box.

Step 6 - Recheck all wiring connections before refitting fuse and side cover / seat etc.

Wires and cables should be secured well away from exhaust and any moving parts of the bike. Avoid running cables near to the high tension spark plug leads if possible.



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

You must check the timing with a strobe light as the static timing will only be approximate (usually within a few degrees).

Re fit the spark plugs and high tension leads. Make sure the leads connect to the correct spark plug.

Start and warm up the engine for 5 minutes.

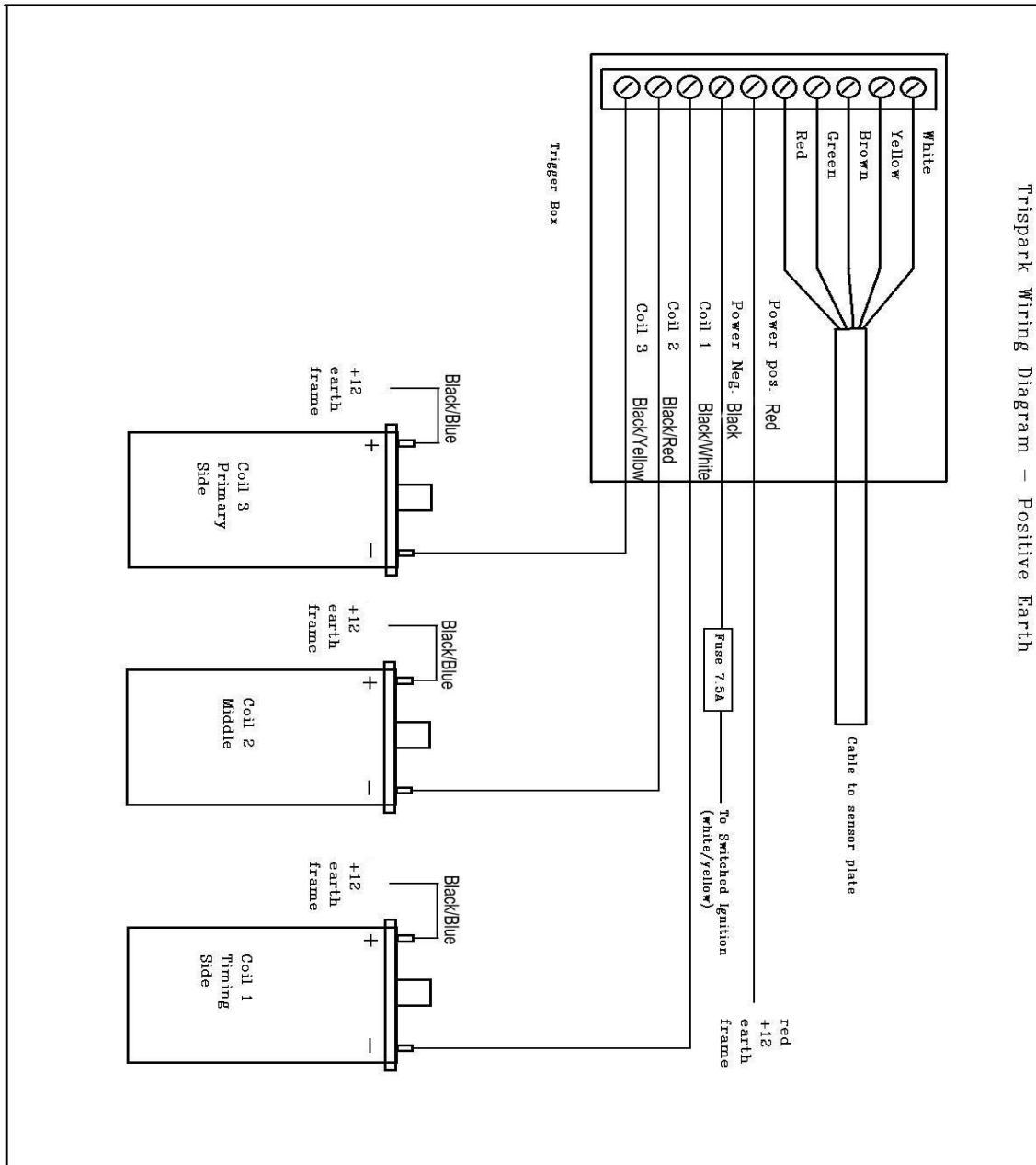
When the engine is revved up to 4000RPM, the timing mark should line up exactly with the pointer. Adjustment can be made by rotating the sensor plate on its slotted holes. Moving the sensor plate anti-clockwise advances the ignition. If the end of the adjustment range is reached before the timing lines up, you may need to recheck the installation of the Tri-Spark rotor.

TIP: Rather than trying to move the sensor plate with the engine going, Mark the location with a felt tipped 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 on the crank. Use small adjustments and recheck with the strobe as above.

Once to timing is correctly set, repeat the strobe test on other two cylinders as a final check that all is working correctly. If a small variation in timing between cylinders is noticed, do the final adjustment on the most advanced cylinder.

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

Important: You must use suppressor caps with 5k resistor fitted or suppressor type spark plug leads (carbon fibre). Either of these options will give an excellent result. Using copper spark plug leads without suppressor caps will affect the operation of the black box. Use this wiring diagram for connection with 12 volt coils only. See the follow section for 6 volt coils.



Follow this wiring diagram for connection with 12 volt coils and positive earth.

Installation for 6 volt coils

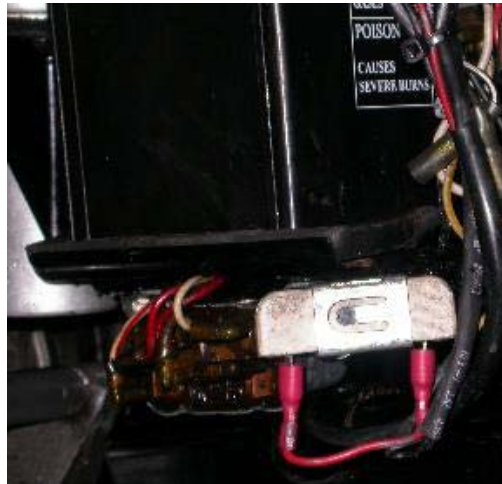
The installation for 6 volt coils is slightly different than for 12 volt coils. You will need to install a ballast resistor and follow the wiring diagram below. The ballast resistor can be the same type as used on a T160 or equivalent automotive type so long as it is 1.5 Ohms. Please make sure the type you are intending to use meets this specification. We do not supply a ballast resistor as part of the kit but it can be ordered separately.

Note: We have compared the spark output for this installation to confirm that it is the same as for the 12 volt stock coils.

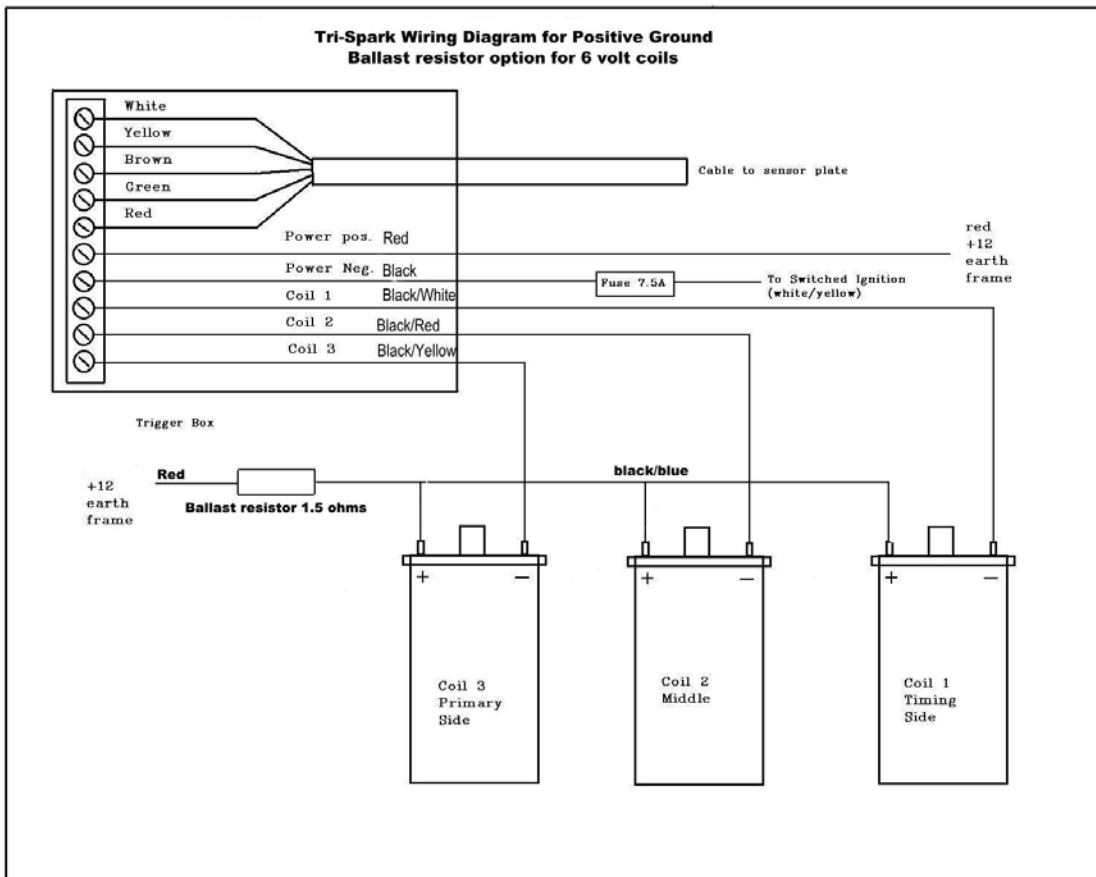
IMPORTANT!

The wiring of the resistor as fitted on the T160 is NOT correct for the Tri-Spark. You must remove the original wires from the resistor and tape them up. Then install new wiring as shown in the wiring diagram. FAILURE TO DO SO WILL DO DAMAGE to the system!

Photo shows typical installation of the Ballast resistor under the battery carrier.

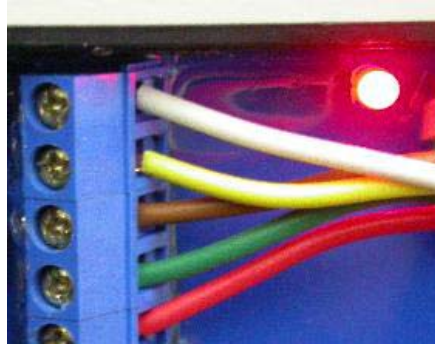


The following diagram is for 6 volt coil connection on a positive ground machine. (Positive ground is the stock wiring system). If your machine has been converted to negative ground, please use the diagram on page 6.



Timing LED operation

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



As you can see above, the LED is very bright so that it can be seen clearly in daylight

1 - If the machine is running at idle, the LED will normally blink at a steady rate

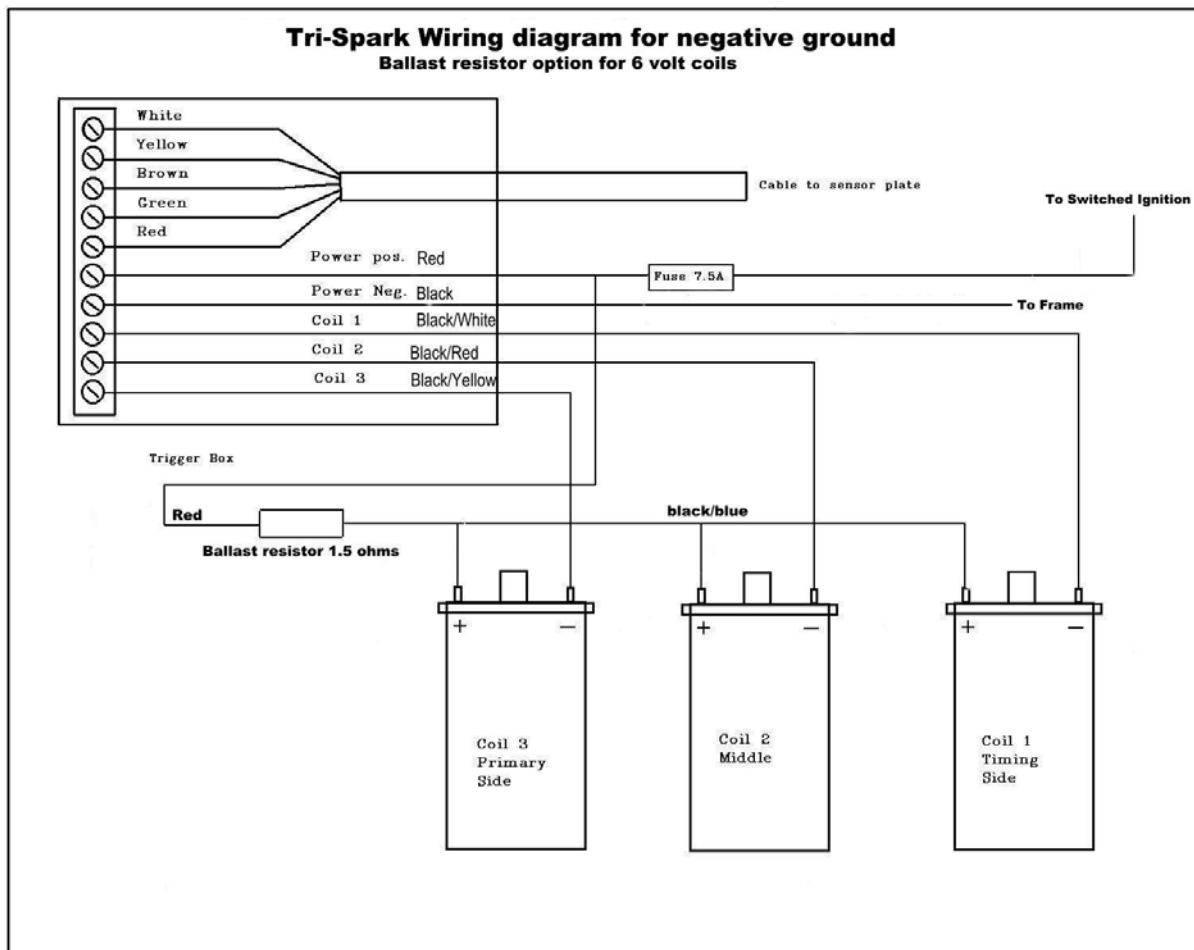
2 - As the revs are increased, the LED will appear to stay on continuously.

3 - To Check the static timing, if the engine is in the timing position and correct rotation, and the sensor plate is rotated back and forth with the pillar bolts loosened off, a point will be found 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.

4 - Additionally, the LED can be used to check the sensor plate operation. With the sensor plate removed from the engine to gain access to the sensors, any 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 sensors are operating.

5 - 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 as it should.

The following diagram illustrates the wiring for **negative ground** machines. The ballast resistor should be omitted if 12 volt coils are to be used.



Only use this diagram if your machine has been converted to negative ground. The stock wiring system is positive ground.