



Scooter Restorations Electronic Ignition Instructions

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The Electronic Ignition Kit consists of the following:

Flywheel, Stator Plate, Regulator, CDI Unit, Earth Wire, and instructions.

When fitted correctly the electronic ignition system should prove to be a worthwhile investment. Unlike points systems, the electronic ignition will never need to be reset (unless you remove the magneto flange).

Myths

Contrary to popular myth the Indian Electronic Flywheel is not heavier than an original Italian Flywheel. Listed below are the original weights of each of the flywheels fitted to Italian Innocenti Lambretta's.

4-Pole Ducati Brass Points Flywheel	Italian Series 1, 2 & Early Series 3	2.65kgs
6-Pole Ducati Brass Points Flywheel	Italian Early Series 3	2.65kgs
6-Pole Ducati Diecast Points Flywheel	Italian Late Series 3	3.25kgs
6-Pole Ducati Diecast Points Flywheel	Italian GP models	3.25kgs
6-Pole Ducati Diecast Electronic Flywheel	Italian GP models	3.25kgs
Indian Electronic Flywheel	Late Indian GP models	2.60kgs

Suitability

The Indian Electronic Flywheel may not be suitable for a highly tuned Lambretta, which requires in most cases a lightened flywheel, but is perfectly suitable for a standard scooter.

Flywheel and Stator Plate

The electronic flywheels and stator plates we receive from India require the flywheel fins to be machined down from the longer fins to original length fins as fitted to all Italian Lambretta's. This is so that the flywheel can be fitted without having to change the flywheel cover.

The wiring on the Indian electronic stator plate is changed because the stator plate we receive is intended for use on a Scooters India 3-wheeler. The wiring harness would be too short in length and the colours and connections would be incorrect.

All flywheels and stator plates are tested in pairs at Scooters India before leaving the factory; over the past 8 years we have sold over 3000 units with another 1000 units in stock.

Electronic Ignition Kits from India

There are two types of electronic ignition kits available from India. The original is from Scooters India Ltd and the other is a copy of the Scooters India Electronic kit. The majority of the problems that we have heard of have been found on the copy Indian electronic kits. We only buy the original Scooters India electronic kit.

From our experience the common problems that customers experience when setting up an electronic ignition are due to incorrect installation. These problems can be avoided by carefully following the instructions below.



A guide to fitting the Electronic Ignition Kit

Remove 6V Points System

First you will have to remove the original 6V Points system comprising of the flywheel, stator plate, h.t. coil, battery, horn, rectifier or regulator and wiring loom.

Tools & Electronic Extras

Before removing your old electrical system ensure that you have all the necessary special Lambretta tools and electronic extras to complete the fitment of your electronic ignition system.

Check the Condition of the Crankshaft

Before fitting your new electronic ignition system, check the condition of your crankshaft taper for any high spots or damage, which might cause further damage to the new flywheel centre boss. Ensure that both the flywheel centre boss surfaces are clean and dry. Also check that the woodruff key is undamaged and a firm fit in both keyways. Check the crankshaft for any excessive play and the magneto flange is in good condition.

Fitting C.D.I & Regulator

Fit the new loom to the frame; also fit the new C.D.I. unit and regulator using an electronic mounting bracket. (We recommend that you fit the C.D.I unit and regulator under the rear of the frame above the rear mudguard where the original H.T. Coil was located, fit the C.D.I. unit on the same side as the original coil and the regulator on the opposite side) using an electronic mounting bracket.



CDI Unit (Capacitor/Discharge Ignition Unit)

The C.D.I. Unit contains several different types of electronic components, such as the S.C.R (Silicon Controlled Rectifier) P.N. Junction Diode and Condenser. On receiving the charge from the low tension coil, the diode (D2) charges the condenser (C1) The pick-up sends a controlled signal to the diode (S.C.R.); the latter, fired, realises the discharge of the condenser C1 on the primary of the ignition coil and hence produces on the secondary the necessary tension for the spark plug.

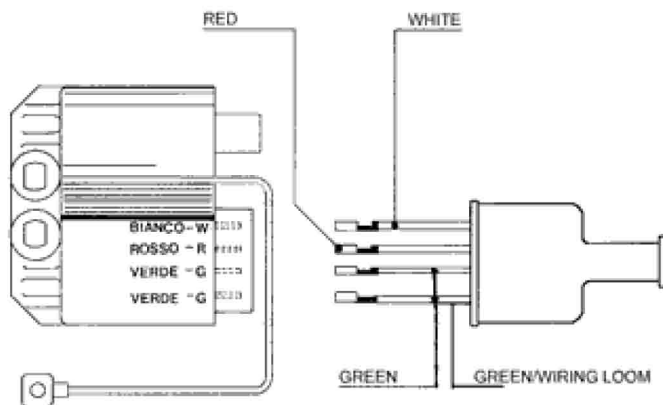
When connecting the 3-stator plate wires and the wiring loom green ignition wire into the CDI unit, be sure to connect the wires in the correct order as mentioned below. If the wires are placed in the wrong order this could damage the CDI unit



Each terminal is marked as follows

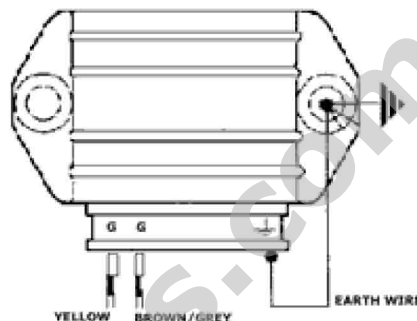
CDI UNIT

WHITE WIRE CONNECTS TO THE TERMINAL MARKED BIANCO/W
 RED WIRE PLUGS IN TO THE TERMINAL MARKED ROSSO/R
 GREEN WIRE CONNECTS TO THE TERMINAL MARKED VERDE/G
 GREEN WIRE FROM THE WIRING LOOM CONNECTS TO VERDE/STOP



REGULATOR

YELLOW WIRE CONNECTS TO FIRST CONNECTION
 BROWN/GREY WIRE CONNECTS TO SECOND CONNECTION
 EARTH WIRE CONNECTS TO THIRD CONNECTION MARKED



Checking operations of the electronic equipment

All checking operations of the electrical equipment, which involves disconnecting the wires (checking of the connections and the devices that are component parts of the ignition circuit) should be carried out with the engine cutout: if not the electronic CDI unit and stator plate can suffer irreparable damage. Do not place the stator plate wiring to earth whilst trying to kick the scooter over. This again could cause damage to the one or more of the electrical components

Regulator

The 12V regulator has 3 terminals; connect the yellow wire from the stator plate to the first terminal on the left hand side, the brown/grey wire with the clear terminal cover from the wiring loom to the second regulator terminal and the earth wire to the third regulator terminal on the right hand side. (See drawing No. 2)

Stator Plate

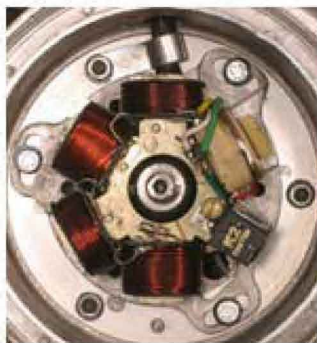
Place the new electronic stator plate into the magneto flange. Be careful to ensure that the stator plate sleeving and wiring is positioned correctly and is not trapped behind the back of the stator plate base, this could possibly cause the wiring to be damaged and earth out. Also be careful not to damage the surface of the 5 enamelled copper wire coils, particularly the ignition low tension coil next to the pick up box which can be identified by the self adhesive insulated cotton tape, this coil is extremely delicate. Any damage to this coil will lead to electrical problems. Lightly tighten the three locating bolts so that they are central in their slots being careful to ensure the stator plate sits squarely in place otherwise this could cause one of the stator plate slots to break.

The pick up coil is a transducer, which converts angular position of flywheel rotor into electrical pulse. The pick up coil sends a pulse to the gate of S.C.R in C.D.I. unit, when it comes in front of the extended poles while rotating.



Flywheel

Before fitting the electronic flywheel, check to ensure that the flywheel is clean inside and that there are no metal objects that have been picked up by the magnets (usually a small tool i.e. socket, washer, screw or nut) bridging across the magnetic poles. Place the new flywheel carefully on to the crankshaft being careful to locate the flywheel on to the woodruff key. Do not tighten the flywheel at this particular stage of assembly, as the flywheel will have to be removed while setting up.



T.D.C



B.T.D.C



Setting up the Ignition Timing

We strongly recommend that you use a dial gauge to set the timing, the cylinder head, exhaust and head cowling must be removed, (a timing disc can also be used for the same job).

With the cowling and cylinder head removed, you can now fit the dial gauge to the top of the cylinder. Rotate the flywheel until you find T.D.C. (top dead centre – the highest point that the piston travels up the cylinder).

When you have found T.D.C. set the dial gauge to zero. On the outer lip of the flywheel fins there is an arrow, which faces the outer edge of the magneto flange. With the dial gauge set to zero at T.D.C. make a notch on the magneto flange opposite the arrow on the flywheel. (Ignore any previous markings that have been made on the other lip of the magneto flange, these would have been made when the scooter was fitted with a points system and these are in a different position to an electronic system) This is now your T.D.C. mark.

From the T.D.C. mark, rotate the flywheel anti-clockwise so the dial gauge rotates to 2.0mm (19 degrees if using a timing disc) for GP electronics or 2.5mm (21 degrees if using a timing disc) for LI/SX electronics. Again at this point make a notch against the arrow. (Ignoring any previous marking)

Next rotate the flywheel further, when the dial shows the reading 3.0mm corresponding to 23 degrees BTDC; mark the third mark on the magneto flange.

Looking through the window on the flywheel (five o'clock) you will notice two lines inscribed on the outer edge of the flywheel. These two lines have to match up exactly with the two lines on the stator plate pick-up box when the flywheel is at B.T.D.C. (Before top dead centre)

If the two pairs of lines on both stator plate and flywheel do not match up you will need to remove the flywheel, slacken the stator plate bolts and move the stator plate in the direction needed to line up both the stator and flywheel. When the two pairs of lines meet up exactly your timing is set and should not need altering.



Before trying to kick the scooter up, remember to fit and tighten the flywheel centre nut and spring washer. The flywheel must be held with a flywheel-holding tool whilst the nut is tightened (anti-clockwise) with a 17mm socket and a torque wrench to 50 lbs/ft (6-6.5 kgs). Please note that you have the correct flywheel centre nut and washer for the electronic flywheel purchased. There are three different type of flywheel nuts originally fitted to Series 1, 2, 3 & GP and only two are suitable for use with the two different types of electronic flywheels. The 6-pole brass flywheel nut and washer is suitable for the LI/SX flywheel, and the SX/GP die cast flywheel nut and washer is suitable for the GP electronic flywheel. **Ensure that you have the frame to engine earth wire connected.**

Now that the timing has been, you can now refit the cylinder head, cowlings, exhaust etc.

As a further measure to ensure that you have set up your timing correctly we recommend that you use a stroboscopic gun. These can be purchased from most high street car accessory shops

Remove the spark plug cap from the spark plug. Fit the lead from the stroboscopic gun on to the spark plug and the other lead into the spark plug cap. Next paint the arrow on the flywheel with some white paint or Tipex, then start the scooter and place the gun near the flywheel fins being careful not to get too close. Timing is correct if the mark on the magneto flange at BTDC aligns with the timing arrow on the flywheel at idling rpm and at 3000rpm and above. At 1200rpm the arrow should be within 3 degrees of the BTDC mark. If the timing arrow is not aligning with the BTDC mark, remove flywheel rotor and adjust stator plate accordingly, to get the correct ignition timing.

Don't forget to change all the bulbs from 6 Volt to 12 Volt

Ensure that all necessary earth wires are fitted

Frame to engine to regulator earth wire

This particular earth wire is extremely important. Fasten the middle 6mm round terminal, to it's original position on the rear frame strut. Next fasten the 5mm round terminal to the magneto flange on the side of the cowling, and last of all fasten the round terminal to the 6mm bolt on left-hand side of the regulator. (Alternatively you could purchase a new frame to engine earth wire with a 6.4mm spade terminal which can be connected straight into the regulator earth connection) This particular earth wire for some reason most people seem to either forget to fit or think that the scooter is either earthed through the cables, the engine silent block mounts or by some other means of earthing. Not having this earth wire connected is one of the biggest causes of electrical problems.

12V regulator earth wire to frame

Connect the white earth wire supplied in to the last terminal socket on the right hand side of the regulator and connect the earth wire to the 6mm bolt that fastens the regulator to the frame.

CDI earth wire

This earth wire comes already attached to the CDI unit and must be earthed to the CDI mounting bracket.

Rear light earth wire

Fitted to all Lambretta scooters, connects into the rear light bulb holder and is earthed to the frame.



Headlight earth wire

Fitted to all Lambretta scooters, connects to the white earth terminal on the Headlight bulb holder to the headlight rim. This method has not always been a successful way of earthing the headlight unit, due to the earth wire being connected to the headlight rim, so you may prefer to use a separate earth wire fitted to one of the four screws behind the gear/throttle wheel.

Follow the Electronic Ignition wiring diagram as supplied with the electronic ignition kit.

Fault Finding

If you have followed the instructions above and are experiencing problems with your electronic ignition system, below is a list of ways to test the various components, which make up the electronic ignition system.

In the case of a defective ignition, which grounds cannot be immediately located with an inspection at first sight, first replace the electronic CDI Unit with one in perfect condition. (Try one from a scooter that is working) The disconnection and connecting operations for the replacement of the electronic CDI unit **should be carried out with the engine cut-out.**

If the replacement CDI unit restores the ignition, the CDI unit should be obviously replaced with one in good condition.

If the electronic ignition is still found to be faulty, inspect the components on the stator plate. Check to see if there is any damage to the wiring and see if any of the soldering, connections, rivets or earth tags have come loose. Then by means of an electrical multi-tester that can measure resistances from 1 to 1000 ohms verify the low tension coil/charge coil and the pickup as follows.

Connect the tester between the green wire and the white wire; it should measure continuity and ohms value 480 ± 15 ohms. (The Scooters India low tension coil (Coil no. 5) has fewer turns at 3100 on the coil than a piaggio low tension coil, the coil reads a slightly lower ohms reading). Then connect the tester between the red wire and the white wire, it should measure continuity and ohms value 100 ± 5 ohms. (Ohms values taken from technical drawings supplied by Scooters India). We have been told by Scooters India that due to air temperature (climate) the readings can vary, so don't be surprised if the readings above are 30 to 40 ohms lower in winter than in summer.

Then by means of an electrical multi-tester that can measure voltage from **0 to 200 volts** verify the low-tension coil/charge coil and the pickup as follows. **Be extremely careful when using the multi-tester not to short out the green and red terminals with each other or directly with the white terminal.** For the low-tension coil connect the tester between the green wire and the white wire on the CDI unit; the reading should measure between **35 to 180 volts** depending on rpm. To check the pick up coil connect the tester between the red wire and the white wire on the CDI unit; the reading should measure **0.03 volts**. If the above readings are correct the problem lies somewhere else. (Voltage values as supplied by Scooters India)

If after having checked the low-tension coil and the pick up, the readings are not as above **replace the stator plate or the damaged parts**

Lighting Coils

The 4 other coils on the stator plate that generate the power for the lighting system very rarely cause any problems (this is probably due to the number of turns on the coils being much less and the enamelled copper wire being much thicker).



