

6V to 12V Conversion

A person recently asked, "I have a 1964 BSA. In order to convert the system to 12 Volts, would I have to replace both alternator stator and rotor, or just the stator?"

The surprising answer is neither!! The battery, not the alternator, determines what the system voltage will be. Simply install the new battery, then the alternator gladly starts charging at the new voltage. You need only add a 12V battery, 12V bulbs and 12V ignition coils. Oddly enough, the 6V horn works great on 12V system; really nice and loud. But this is not the end of the story, so keep reading.

Why Convert to 12V ?

A little bit of education is required here. If you have a 35W headlamp bulb at 6V then that bulb needs 5.8A of current, but that same 35W bulb needs only half that much current at 12V. This is important because it's electrical current that determines the size of the wire in your harness. So, for a given headlamp wattage, 12V simply uses the wire more efficiently. And too, if there should be *any* corrosion in your headlamp dip switch or one of the bullet connectors, Ohm's Law tells us for an equal amount of corrosion, your headlamp will be less affected and therefore remain much brighter using 12V. Therefore, a conversion from 6V to 12V has an immediate safety advantage.

Lucas Wiring Differences

Differences in Regulation

You also need to understand some background wiring information. Lucas 12V systems use "electronic" regulation; 6V Lucas systems used "mechanical" regulation. Whereas the later 12V systems used a Zener to keep from over-charging the battery, back during the 6V days there were no such electronic wonders. 6V regulation was achieved using a "3-wire stator"; a single stator with 2 outputs (1 Low, 1 High). Today people largely forget that there was simply no other way to achieve voltage regulation in a box small enough for motorcycle applications.

During daylight hours with a 6V system (headlamp OFF) your bike ran on the Low alternator output. When you switched ON the HL at night, that same switch also turned on the High alternator output. The loads on the electrical system were simply matched to the alternator output and that kept the battery from over charging. You can easily spot these systems; they're the ones with rotary HL switches.

The issue with using the older 6V "mechanical regulation" was that the output was matched to the requirements. To keep from over-charging the battery, there was never much excess, day or night. If you took off with 6V, then you pretty much arrived with 6V. If you took off with 5V, then you might arrive with 5.5V depending on the length of the ride. However, if you took off with 3V, you'd most probably arrive with no more than 3 to 3.5V. There was simply no way to "sense" the need for extra charging when the battery was low, or cut back on the charging when the battery was fully charged. Remember, this was a time well before the NASA "space program" and no small semiconductor devices (transistors, diodes, etc) existed to make regulation possible in a small, rugged package that would fit a motorcycle.

If you convert to 12V using the original 6V wiring, the same thing will happen. Back in 1964, this was OK because you rode everyday. Nowadays, people ride their "classics" at best once a month and the batteries usually need a little extra charging to get going. That's why the easiest solution is to physically rewire your alternator stator to match the 1968 and later specs. It's very simple to do, and will probably take you less than 5 minutes. See figure 1.

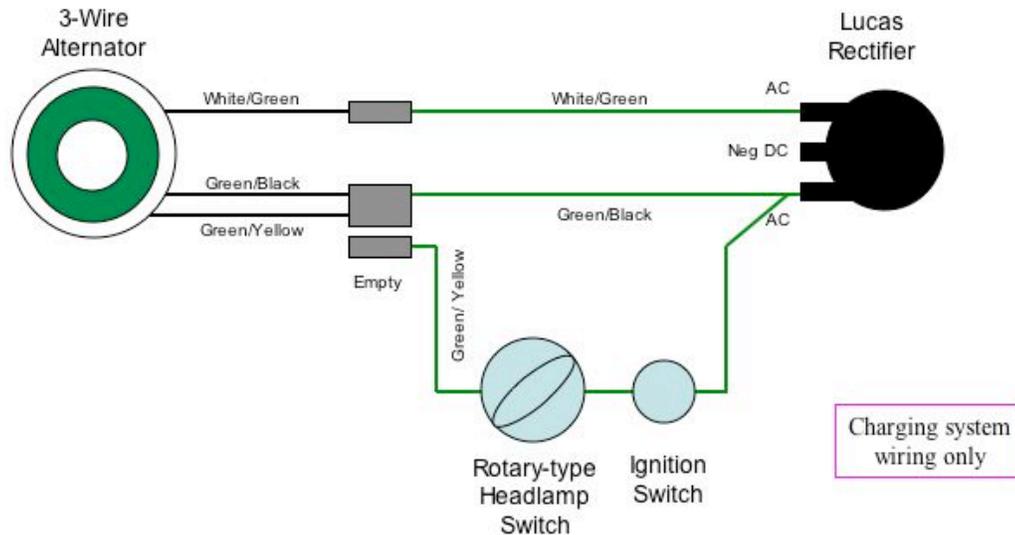


Figure 1. AC system only. The simple method

Differences in Ignition

If you'll carefully study your pre-1968 ignition switch, you'll probably see a central OFF position and 2 other positions, one marked "ON" and the other marked "Emerg". When these bikes were new all electrical systems were notoriously unreliable. Any long trips were more than likely to result in a walk home. British engineers decided it would be best to give an alternate way of cranking the bike should the battery give out. Therefore they wired the ignition switch so that the bike could be cranked using battery voltage (DC), or, in an emergency, powered directly from the alternator (AC). The idea was to crank the bike on *Emerg* and then cut over to regular DC ignition once the machine was under way.

The problem was that when either the headlamp switch or the ignition switch got any water inside, they are highly likely to introduce AC power into the DC ignition, which makes the bike run badly and is extremely hard to diagnose without an oscilloscope. Most mechanics today do not even know this potential issue exists. Thankfully there is a quick and easy way to rectify both the charging and ignition problems during a 12V upgrade (or a 6V re-wire). See figure 2.

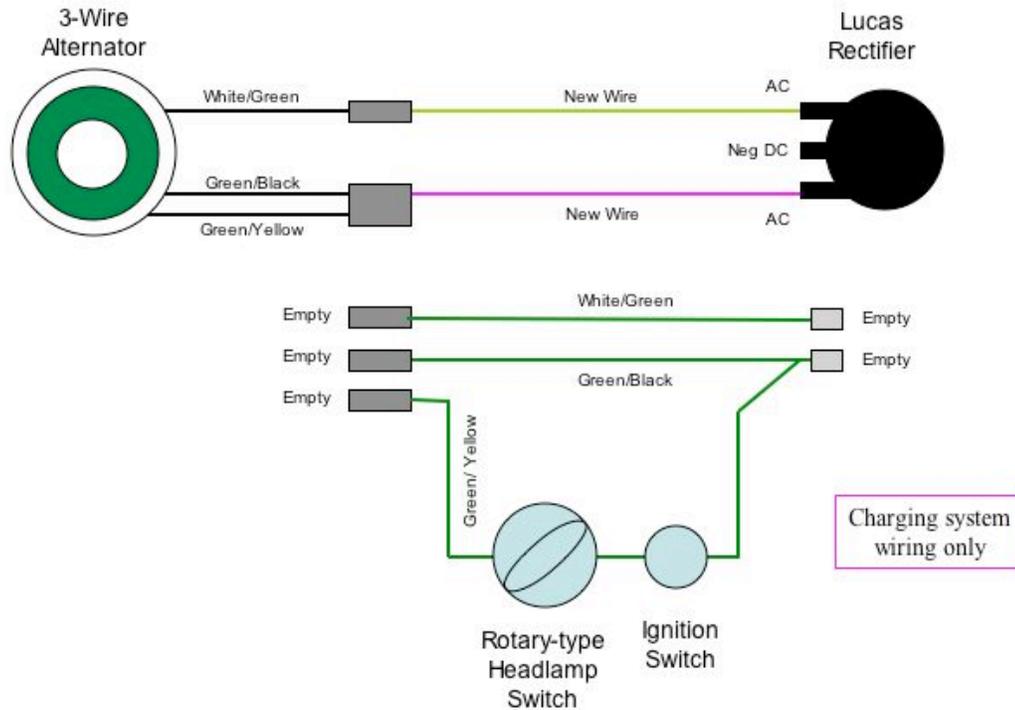


Figure 2. AC system only. The best method

In my opinion the best way is to simply fabricate your own 2-wire AC sub-harness to connect the alternator output directly to the rectifier (or modern rectifier/regulator unit). By not incorporating the old harness a whole raft of present and future issues can be completely avoided. The existing harness wires are simply left unconnected and can be tied neatly out of harm's way.

Power Regulation

Conversion to 12V is a “no brainer” for most owners. It does not change the outward looks of your classic, but will definitely enhance the operation and safety of the vehicle. However, the conversion *should* also include the addition of some kind of regulator to keep from cooking the new 12V battery. Most knowledgeable mechanics would suggest a Typanium or Podtronics regulator unit in this situation. They are inexpensive, are highly reliable and are very easy to install. For more information see the GABMA tech articles.

Installation of the new regulator simply consists of installing male connectors to the new regulator, then unplugging the existing rectifier and plugging the female harness connectors up to the new regulator. You can simply lay the new regulator in the tool tray until you decide where to mount it.

Other Notes

- Sadly, if you want to retain your 6V system out of some kind of loyalty, there are no electronic regulators available in that voltage. All the modern rectifier/regulators that I am aware of are available only in 12V.

- If you own a twin cylinder machine and are contemplating the move to a Boyer electronic ignition, then a change to 12V should be done at the same time. The reason for this is because the Boyer works best with dual 6V coils. Therefore, in place of buying 2 new 12V ignition coils you can purchase the Boyer EI for about the same price and utilize your original 6V coils.
- If your stator is not potted in epoxy (that is, if you can see the wire windings of the stator), then your stator is a type that does **not** have a long and glorious history. In fact most stators of this type failed within the first 5 years. You should go ahead and use the existing stator until it fails, but know that its failure is not connected to the 12V conversion.

Hope this helps!

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