

In depth Engine – DC conversions

TECH ENGINE MB DC ELECTRIC CONVERSIONS

DC (Direct Current) is becoming a popular conversion these days.

DC means the charging side (lighting side) of the Electronic ignition usually uses a Battery to give a constant supply of stable electrics – giving better lights and lights that don't flicker at low speeds.

The conversion is very easy if you swap a few things on your AC (Alternating Current) Lambretta ignition.

These questions constantly crop up and to save answering separate enquires all the time, it's prompted me to write this Tech Article.

BASICS

If we go back in history, from the mid 1960's Innocenti mainly produced a 6 poll, 6 volt, AC system. 6 poll means 6 magnets fitted in the flywheel which gives 6 positive and 6 negative pulses per revolution giving a good power output – this design has carried on into today's systems. Innocenti also did 6 volt DC systems based on the same ideas. Innocenti moved away from points in their Electronic ignition in the late 1960's fitted to the Gp200 Electronic. But as we know, Lambretta production stopped just afterwards.

In the 1960's various companies offered a 12 volt conversion using UK Lucas parts to give a points system with 12 volt DC lighting but with the strange Lucas positive earth. This system meant removing 2 charging coils and replacing them with 2 more of the large coils left and used the same points coil – today the conversion is much easier.

Vespa made a Femsatronic for the Rally 200 in the 70's which was a totally different design to the Innocenti Ducati ignition. It wasn't until the Vespa PX/PE engines turned up in the 80's that we really started to see a 12 volt ignition which was very similar to the Lambretta Ducati style ignitions. PX125/150 used a points ignition system with a stable 12 volt AC lighting system. The PE200 used an Electronic ignition system very similar to the Gp200 Electronic. The Vespa Ducati system used the same lighting set up as the PX system but used a newer 12 volt Electronic pickup pulse coil instead of the points and CDI coil system which looked similar to the Innocenti Gp200 system but updated and this is still the basis of most Lambretta systems 40 years on.

Lambrettas did get an Electronic system in the 80's with the Spanish Motoplat, these were totally different to the Ducati design. MSC produced a version of the Motoplat but again different, with no interchangeability of parts.

In 1985, I looked at the PX system for the first time and thought, that's is so similar to the Lambretta system. I modified a mag housing, fitted a PX

stator, machined and altered the flywheel to use plastic fans and removed and refitted a Lambretta cam and got a new 12 volt lighting system – much improved over a Lambretta 6 volt system. I then came across the PE flywheel and stator and did the same conversion and fitted it to a Lambretta. After a few teething issues I had it sorted and we produced an exchange 12 volt AC electronic ignition – all based on Ducati Vespa parts that all converted onto the Lambretta Ducati points parts.

In the late 80/90s Vespa produced a DC version based on the same designs. In the mid 80's AF Rayspeed produced their AC Lambretta Ducati ignition systems – these again were based around the Gp200 Electronic and Vespa Electronic systems but used a smaller flywheel similar to the Vega flywheel. They also did a DC version which never worked from day one!

In the late 80's SIL produced their version of the Lambretta Electronic ignition, the flywheel was different to look at but worked the same. The Stator looked similar to the AF Electronic kit but the wires were coloured different. The SIL versions and copies of the SIL version worked okay but did fail on a regular basis. If it wasn't the Low Tension coil or Pulse pickup coil failing, the lighting coils would burn out or the rivets would come loose or the alloy on the stator plate would just shatter! You could modify them but you was always chasing your tail. The basis of the SIL ignition are still used to this day and get converted to DC regularly.

Today there are other better manufacturers of the Lambretta Electronic system bgm, Readspeak, Scootronics and some other Indian manufacturers.

Armed with all this information you can improve and convert and miss match parts to work as most parts are remade everywhere and are interchangeable.

CONVERTING IGNITIONS FROM AC TO DC

1. The easiest way would be to buy a stator or system already made as DC. Only bgm and Scootronics offer a DC stator at the time of writing. Vape also offer a newer system but is totally different.
2. Or convert your existing Electronic stator plate then convert the other parts required. CONVERT YOUR OWN STATOR PLATE This is very easy and you only need a good soldering iron and some wire. The idea is, you remove the earth wire from the lighting coils then extend that to the rectifier. On an AC Electronic stator plate there are 5 wound coils and a pick up pulse coil which is the square Black box. From the pick up coil going clockwise there is a wound coil, this is connected in various ways to 3 other coils – 4 in all. These are your lighting coils. From the last coil there should be a Yellow wire if its a modernised stator (Indian ones usually use a Brown wire) This normally goes to a AC Regulator. Around the first/second coil you should see a winding going to an earth tab on the stator. Unsolder the earth tab wire. Give it a good clean and solder on another Yellow wire the same length as the other Yellow wire, providing that is long enough to go to the new DC Rectifier. Usually mounted above the rear mudguard. Make sure the new Yellow wire is routed similar to the other wires coming off the stator so the wire is away from moving parts. It's a good idea to araldite the

soldered joint and around the wire to the stator to stop breaks from vibration. Thats it, it's as simple as that. From here it's a case of convert the rest of the electrics to DC parts.

DC ONWARDS

AC stators have one Yellow wire from the stator to the AC Regulator (the stator earths its self). These Regulators can be a 3 pin Vespa style regulator or a later 4 pin Regulator/Rectifier which can offer a very small DC supply – this DC supply can normally only power a USB, Sat Nav or power a brake light or a small battery and take feeds off that. This system WILL NOT charge enough to power lights or spot lights. This is why people want a full DC system. The Reg/Rec will need removing it's not needed for the DC conversion. The newer DC system will power lights by connecting the 2 Yellow wires to a DC rectifier which usually also has 2 Yellow wires. Either Yellow wire from the stator can go to either Yellow wire on the Rectifier it does not matter. On the new DC rectifier there should be a Red wire which is 12 volt DC power out and a Black wire which is earth. Simple! Make sure the Rectifier is earthed to the frame. And also make sure the frame is earthed to the rear light and back to the engine casing. From here as long the engine is running you can have a DC feed for lights. You can do this without a battery but at low speeds the lights may dim.

The beauty of the full DC system means you can have lights that work without the engine running, and with the engine running the lights won't dim. So there's 2 systems.

1. DC with no battery. You need a fuse fitting at the Red wire from the Rectifier to make things safe if you mistakenly short circuit a wire to earth (this can set your bike on fire) Fuse size should be 5 – 15 amp.
2. Full DC with a battery. You will need a battery capable to soak up the power coming from the stator plate, too small and the battery could burn out if there is no load used (load would be running with the lights on) battery too big won't charge as well. Ideally something like a 12 volt 5 – 9 amp battery will do. Batteries to use are lead acid, sealed lead acid or AGM (absorbed glass matt) which are to be preferred. You can use Lithium batteries as well but read up charging them.

SETTING UP THE WIRING

The Battery can be fitted where you want. Usually in the standard position between the toolbox and petrol tank. But some people use a long range tank so a battery gets fitted at the rear frame area by the mudguard or you can also fit it behind the legshields on a spare wheel rack or in a legshield toolbox. Where ever it is fitted it must be secure and make sure the terminals don't touch the frame. You can add a fuse at the positive terminal end, if there is a short the fuse will fail rather than burning through the loom and a fire!

A top tip is to use quick release spade terminals off the battery.

When going down the full DC route this will mean you can have main lights, side lights, horn and brake light working – this is simple. You can then add

accessories like Spot/Fog lights, Sat Nav, USB, horn and electrical toys etc.

Now the system is only as good as the amount of power you can get from the stator which will vary on the flywheel/Stator combo, engine revs and the load it's to supply. If your going to use 2 spot lights with 55 watt bulbs – thats 110 watts already. Add to that a headlight 25/35/45/55 watts your up to say 165 watts! Add a back light at 5 watts and a speedo at 5 watts it's all going in the wrong direction there will be too much load as the lighting drains the battery and the stator flywheel combo can't keep up. Thats if you drive everywhere with your lights on and spot lights on. It's easy to reduce the load by fitting a LED rear light, fit that and your headlight becomes brighter so you can reduce the head light to 35 watts – now were going in the right direction. Reduce the spots by removing the gas guzzling halogen bulb to LED and you have a system that won't drain the battery. If you do go down the spot light route pick the bigger battery.

As a compare, the AC system is usually listed as 80 watt or 120 watts – in reality they are around 80-100 watts. And we know they worked with a 25/35w headlight bulb, 5w tail light and a 4w speedo bulb totalling 49 watts, add the brake light coming on coming to a stop and it goes to 69 watts – and we know on some bikes when the brake light is used the headlight dims! The trick is to fit a LED rear light it transforms the main light. Comparing to the DC system you should have more power out put with out changing the flywheel and stator plate.

SO HOW IS THE POWER DISTRIBUTED

Power has to be pushed through the loom and controlled by switches. If your using your own loom or someone elses you will need to add a Red extension wire to the Battery from the rectifier and take a feed off the battery to make the power go where you need it. MB Scooters offer looms to suit you, from a basic AC loom in Black or Grey that will work as a AC fed DC supply loom (running with no battery) or use one of these looms with our extra add on DC loom in Black or Grey. This DC loom connects the Rectifier power feed to a battery where ever it is located. And it will from there send a DC feed to the leg shield area and the headset to allow extra pick up DC feeds for the toys and Spots as well as feeding all the normal areas.

With this extra DC loom any terminals not used will need blanking off to be safe.

Follow the ignition switch wiring for a standard Lambretta switch and everything will work. If your doing a Spot/Fog light conversion you will need a light switch wired to suit you. For instance you could wire your Spot/Fog direct to the main lights so they are on all the time when the lights are on (I don't reccommend this). If you wire say a Li switch you can have Spot/Fogs on with out the main lights. You can use the main Red power feed in the loom to feed DC power to toys.

These days people want a Sat Nav, a fag lighter, rev counter, AF meter, EGT meter, speedo or a simple USB for many things like a camp bed pump. These toys have a low drain of power so you can use quite a few. To be super safe

if theres an over load you can fuse each item with say a 5 amp fuse but things get a bit cramped. Everything these days are powered by DC as it works and is stable. Anything run on AC with a AC-DC charger can be temperamental so DC is the best way forward.

If your using a normal Lambretta ignition switch, AC or a DC type the system is live all the time. Even with the DC type – the Battery is live! Which means the horn and brake light can be used by others if the ket has been removed if your not around! The DC switch allows you to have parking lights, so you can remove the keys and walk away with the parking lights still on. If at night you or someone have a break down and you need lights, the DC system can be turned on with out the engine working. The down side is – over time, and it can be only a few weeks or a month or so the battery can drain to earth. There are a few ways to sort this out. The battery needs cutting from the system. You can remove the Red power wire off the battery. You can add battery spade terminals as mentioned so it's easier to remove. You can add an on/off switch/button somewhere to isolate the battery off. Or you can bolt on a quick isolator on the battery. Or you can use a real DC ignition switch where – in the off position the Battery is isolated off, this is the preferred way – MB make a full DC switch that fits all.

When converting to DC make sure the bulbs are 12 volt. Make sure you use a 12 volt DC horn or even a 6 volt DC will do. Switches are all the same as standard. Finally make sure all connectors are fixed tight and mounted correctly so they can not come loose or foul to bare metal and short out to blow a fuse as the worse case would be to set the bike on fire. If you have done all this then you are good to go.

DC PARTS FROM MB SCOOTERS LTD

- DC kit, Gp, Red CDI, bgm
- DC kit, Gp, Blue CDI, bgm
- DC kit, Vape
- DC stator
- 12 volt DC horn
- 12 volt DC rectifier
- DC ignition switch
- Battery 12 volt 1.2 amp, super small
- Battery 12 volt 5 amp, small
- Battery 12 volt 5.5 amp, medium, fits in original Battery tray
- Battery 12 volt 5.5 amp, medium
- Battery 12 volt 9 amp, large
- Fuse holder
- Fuse 10 amp
- Fuse 15 amp
- Fuse 20 amp
- Fuse holder mini
- Fuse 10 amp mini
- Fuse 15 amp mini
- DC wiring loom, Black
- DC wiring loom, Grey
- Extra DC wiring loom for AC looms, Black

- Extra Dc wiring loom for AC looms, Grey

Any questions email mark@mbscooters.co.uk