



## XT/DT 12V CONVERSION

### Trouble shooting guide

Rex's 12 volt conversion is an extremely well proven system used on modern motorcycles today. Its intended for use with standard factory equipment, IE filament bulbs and lead acid batteries. One advantage is that the wiring loom remains exactly the same making this is an extremely easy conversion to do. Fitting our kit may not fix a pre-existing fault on the bike however!

If you are experiencing problems it is vital that the bike is set up as below before effective trouble shooting can be carried out:

- Standard Yamaha or Kedo wiring loom (we can't help with your own design of wiring)
- Correct type of battery is fitted, this must be a lead/acid, sealed or AGM type. The battery accept and hold a charge, an intelligent charger must say the battery is good. Replace old or faulty batteries. Lithium batteries must be replaced with the correct battery technology.
- Headlamp bulb must be no more than 45 watts and must be a filament bulb.
- NO LEDs in the system (except for the indicators)\*
- If there are LEDs replace them with standard filament bulbs while trouble shooting.
- Remove accessories connected to the DC circuit, IE phone or Sat Nav chargers.

\*If the indicators all come on at once or the flash rate is not correct see our LED indicator fixes on the Rex's tech support web page at [www.rexs-speedshop.com](http://www.rexs-speedshop.com)

**If the bike is not in this condition our technicians will insist you rectify the situation before they can help you. You cannot just 'jump in' to any of the tests without first having done this stage!**

The system is not intended to be used with lithium batteries and any battery fitted must be able to accept the machine's charging system output. All motorcycle regulator/rectifiers are designed to be used with lead acid type batteries. Smaller than recommended batteries are likely to over charge and must not be used.

It should be noted that accessories connected to the DC circuit such as chargers for phones or USB devices use a 'switched mode power supply.' Cheap unbranded units tend to produce a lot of electrical interference, (for example a nearby radio go out of tune or produce a fuzzy sound when the charger is switched on). This 'electrical noise' can interfere with the voltage regulator so must be disconnected while trouble shooting.

Once the bike is correctly set up as described and the problem still exists we can begin at looking for probable causes. When troubleshooting its best to "break the system down" (in your mind) in to chunks and look at individual sections. This makes it much easier than trying to consider the system as a whole.

***Testing must be carried out by a trained, experienced person with professional quality tooling and access to the shop manual. Damage to the regulator will occur if it is incorrectly connected to the battery, disconnected while the engine is turning or if testing is not carried out in strict accordance with the workshop manual. Regulators returned with burnt out rectifier diodes WILL NOT be replaced under warranty.***

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***The bike's workshop manual is required in conjunction with this testing guide. Nothing contained in this publication over rules any safety warning or caution given in the Manufacturer's shop manual.***

In each section we list the most commonly seen problems first then the ones we see less frequently last.

## **Fault: No DC voltage when the ignition is turned on**

- \*Check the fuse. This should be the same rating as the standard fuse.
- \*Does the battery still make power with a load on it? A test meter will only measure the unloaded voltage. Replace a faulty battery
- \*Carry out testing of the wiring as per the shop manual for loss of DC voltage.

## **Fault: No AC voltage**

- \*AC voltage is only produced with the engine running.
- \*Check the connections at the generator.
- \*Check the connections at the new regulator/rectifier. Is the connector pushed fully home?
- \* Is there AC power coming from the generator?

Testing the Generator Output.

When doing the following test only rev the engine sufficiently to ascertain power is available and conduct the test only for the shortest possible time. Do not hold the engine at high revs with the generator disconnected.

1. Disconnect the generator lead where it connects to the wiring loom.
2. Use a high quality 'auto ranging' multimeter set to AC voltage.
3. Connect the black lead to the main wiring loom earth (at the regulator).
4. Connect the red lead to the yellow from the generator, start the engine and rev it so you see 20-30 volts (2000-4000 RPM).
5. Repeat the test with the red wire connected to the white wire from the generator. You should notice that 20-30 volts is obtainable at slightly lower RPMs.

If there is a good 20-30 volts the generator is OK.

## **If the test fails, possible causes are (in order of most common occurring):**

-Have you fitted our electronic ignition (XT500)? Are the wires on the back of the stator pinched against the engine? If so these must be replaced.

-Is the generator lead in good condition? Has it been damaged by the drive chain? Degrease and inspect the wires for small nicks, cuts or damage. If it has been damaged or is in poor condition the loom must be replaced. Ideally there should be no repairs in these wires. We stock repair looms for some generators, failing that our workshops can repair the loom.

-The original Yamaha lighting coil has failed. If the insulation at each end is missing, the copper is loose on the steel core or the copper windings have a distinct pink/green or black colour, the lighting coil has failed and must be replaced. We manufacture new 12 volt lighting coils or can rewind a 6 volt one.

*Note: burnt out lighting coils on the XT/DT are rare. In most cases we have seen where it has burnt out, the owner has attempted to run the entire bike on DC power using a standard DC regulator by connecting the regulator to the white wire and using the earth on the lighting coil as the other AC connection.*

-A new lighting coil on an RMK kit has failed. Return to base for inspection/repair.

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## If the test is good:

\*If the generator is producing AC power, re-connect the lead to the wiring loom and carry out the tests above, this time at the regulator. Put the red test probe in the back of the connector housing with the regulator connected. You should see 12-15 AC volts on both the yellow and white wires.

\*If this voltage is present, follow the workshop manual for troubleshooting the wiring loom. It is likely to be a wire connected incorrectly in the headlamp (common if the loom has been replaced), a broken wire or faulty switch.

## AC at the headlamp appears to be incorrect (no blowing bulbs or dim lights)

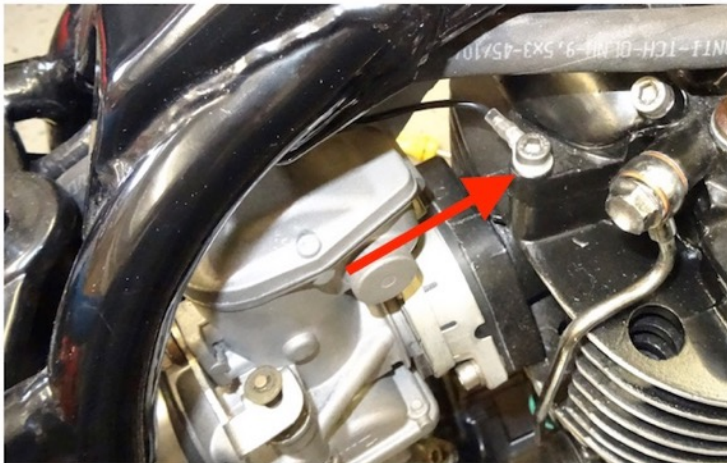
\* This test is not recommended as most multimeters do not read AC voltage accurately and are often very inaccurate at frequencies other than 50Hz. This test is invalid and should not be done. If the lights are working leave them alone!

## Fault: DC voltage at the battery is high (15-17 volts)

**Important: If using a battery eliminator its possible the DC voltage may run as high as 15.5 volts. Provided there are no other faults, this is normal when running a capacitor in place of a battery.**

### Background Information

As the lighting coil is earthed at one end the earth return path is equally important as the 'feed' wires to the bulbs. The earth is a feed wire on AC lighting systems.



If the earth is not good the most common fault is over volting (normally up to 17.0 volts) on the DC circuit, this is because the regulator 'sees' the system voltage as being low due to the poor earth connection so it ups the output to compensate.

### Fitting a Jumper wire

In most cases fitting a jumper wire between the engine and the main wiring loom earthing point (regulator mounting bolt) will cure many charging faults. We can supply a jumper wire P/N JW-1 or you can make your own. You will need a 5 & 6mm ring terminal and a length of wire 1-2mm core size.



If this improves the problem but the charging is still over 15.2 volts with a battery, carry out a detailed inspection of all the earthing points and crimp terminals in the wiring loom, often its found the wires have corroded at a terminal or where wires are joined internally in the wiring loom. Occasionally even a brand new loom may have a poor earth where the earths join internally so don't rule this out.

On negative earthed vehicles the earth wire will suffer from corrosion. On positive earth vehicles, the frame suffers corrosion.

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## Other problems

LEDs with 'on-board' power supplies (the type that run on both AC and DC power or can be connected any way round) often cause voltage regulation issues. LEDs in the main lighting system must be removed (LED indicators - will not cause a problem when the indicators are not operating).

## Very High DC Voltage (18 volts or over)

\* If you have carried out the checks above and fitted a jumper wire and the DC voltage is over 18 volts, suspect the regulator. Return it to us for testing.

## Fault: DC voltage is below 11.8 volts all the time.

- \*Faulty battery or battery eliminator
- \*Check that the rear brake light switch is not stuck on.
- \*Accessories such as heated clothing/heated grips or chargers drawing too much power.
- \*Lighting coil fault. If the insulation at each end of the winding is missing, the copper is loose on the steel core or the copper windings have a distinct pink or black colour, the lighting coil has failed and must be replaced. We manufacture new 12 volt lighting coils P/N: LC-1 (XT) or LC-3 (DT) we can also rewind 6 volt coils.
- \*Regulator fault, return for testing.

Note on early XT500 kits its possible to reverse the yellow and wire wires at the generator connector. If your kit is the type that have bullet connectors at the generator connector, try reversing the wires and measuring the DC voltage again.

## Fault: DC voltage low, 11.8 - 13.8V with the head lamp on.

- \*Check that the rear brake light switch is not stuck on.
- \*Check that the connections are made correctly to the the tail light unit. A unit where the 21 watt brake light filament is on all the time with the headlamp will bring down the charging voltage. Remove the lens and observe the correct (brighter) filament only lights up when the brakes are operated and that the duller one only lights with the headlamp.
- \*Faulty battery or battery eliminator.
- \*Check that the head lamp bulb is not more than a 45 watt bulb.
- \*Check that all the instrument & pilot bulbs are filament bulbs rated at 2-4 watts
- \*Accessories such as heated clothing/heated grips or chargers drawing too much power.
- \*Lighting coil fault. If the insulation at each end is missing, the copper is loose on the steel core or the copper windings have a distinct pink or black colour, the lighting coil has failed and must be replaced. We manufacture new 12 volt lighting coils or can rewind a 6 volt one.
- \*A new lighting coil on an RMK kit has failed. Return to base for inspection/repair.
- \*XT500s only: There are 3 different versions of the XT500 lighting coils (points ignition models). Pre 1978 versions were very much smaller than the 1978 and later versions. In most cases even the early versions work well with Rex's conversion, if yours does not first try removing the pilot light bulbs and those in the instrument housings one at a time. If the charging voltage comes up to above 13.8 volts with these bulbs disconnected the winding in the generator is an early one that is now weak and should be replaced. Our LC-1, 12 volt lighting coil will cure this problem.

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\*Regulator fault; it is extremely unusual for a regulator to give a slightly low output. If the regulator fails the voltage will be off by a large margin, the same is true if a diode in the rectifier has failed.

If the charging voltage is struggling to climb, its normally due the winding in the generator failing or too much load on the system.

## Fault: Headlamp dims as you rev the engine

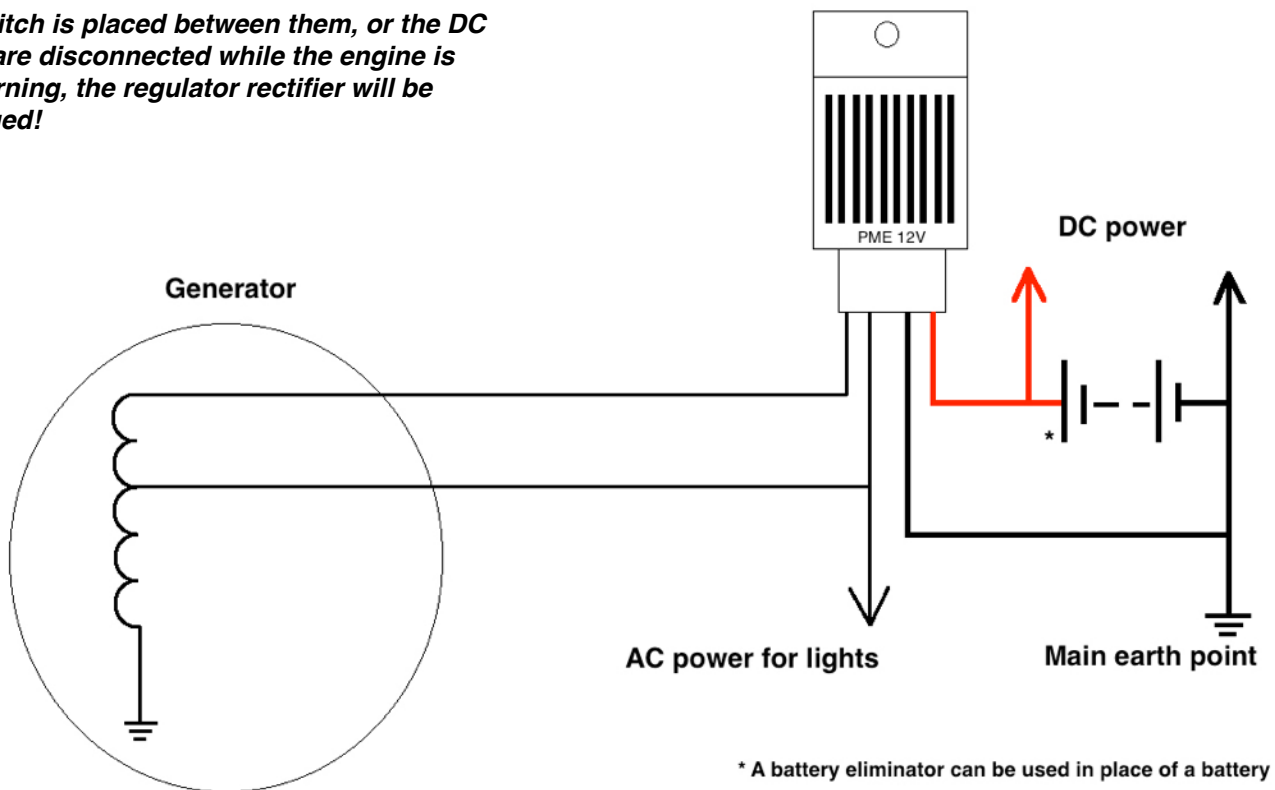
- \*Loose connection, possibly in the handle bar switches
- \* Regulator fault. Note that the battery must be correct type and in good condition.
- \* Failed battery eliminator.

## Wiring diagram

Our 12 volt conversion replaces the separate regulator and rectifier with a modern combined unit design specifically for this type of system. The new regulator plugs in to the stock wiring loom at the AC lighting and DC connections. As there are no changes to the wiring or the way in which it works, the standard shop manual is used to trouble shoot wiring problems

***The regulator rectifier must be permanently connected to the battery or battery eliminator.***

***If a switch is placed between them, or the DC wires are disconnected while the engine is still turning, the regulator rectifier will be damaged!***



## Further Information

Our workshops offer a wide range of electrical services and we design and manufacture generators, 12 volt conversions, CDI units and electronic ignition systems.

Unfortunately our technicians cannot come to the telephone and talk through wiring problems on your motorcycle, if they did none of the work sent to us would ever get done! For help e-mail:

**[tech.support@rexs-speedshop.com](mailto:tech.support@rexs-speedshop.com)**