

12V/Magneto and how Not to do it. Alternators, Zeners and regulators.

In the beginning of Alternators on our bikes-late 50s. Both Lucas and Wipac regulated the charge to the battery by switching the alternator output into the rectifier. It was a bit basic but it worked adequately. Initially there were three levels of control, The Lucas system, on ignition only- shorted some coils, (done via the White/Green wire. {Later this option was abandoned}) on side lights- removed this short and on head light brought in more coils. (Green/Yellow to Green/Black-higher output comes in to circuit). This was all ok on 6V systems of the day, with Coil or Magneto ignition. But today things can be troublesome if you want to use some of the Cyclon cells. These 'stay up' when the bikes isn't used for some time BUT there is a snag- they won't tolerate the older 6V alternator switching system as they will tend to over charge, especially if we have magneto ignition! The voltage goes up and hence out of spec for the Cyclons, the over charging will then dry out the cell-failed! Such problems are aggravated by 50 mile or more journeys. The short run to the club and back with the lights on 'gets away with it'.

Then in the early 60s the Atlas and 650ss appeared with Wonder of Wonders, 12V. All you had to do at first was place a Zener diode across the rectifier output. But with coil ignition you really needed a bit more electricity so the alternator wires were swapped to give the higher output (Green/Yellow swapped with Green/Black) with lights off. Finally it was realized that we could have full alternator output being used. This would allow all of the alternator switching to be dispensed with and eventually the alternator changed from the 3 wire RM19 (and earlier numbers) to the RM21 2 wire. BUT those with magnetos start to run into a potential problem. The system seems to work, UNTILL one day the Zener fails, why?

We have to now understand the Zener Diode a bit more and see the pitfall. The Zener is a 100W device, that is it comes up to its regulation voltage and starts to conduct, (and gets hot, so needs a heat sink) if you then increase the voltage presented to it, it conducts more (the Voltage across it rises a little) and of course the current through it increases. Until it gets to 100 Watts that is 7 Amps (at 14.2V) it will get very hot and then fail! Now we have a 120 Watt alternator (RM21) just on 9 Amps driving this! But luckily we have battery charge current of say 1.5Amps. So you see that with a good RM21, plenty of revs and a well charged battery you could suddenly be embarrassed with a blown Zener-followed closely by an overcharged battery and blown stop light-bulbs etc. A blown fuse (shorted stoplight!) would also remove the battery load so again you rush into the danger zone. IF you have an old alternator/rotor with low magnetism, if you keep your revs down, if you keep your lights on, you might survive.

The real answer-you could retain the alternator switching (needs RM19 and the older switch PRS8 or 88SA) or you could go to the 'new' style regulator rectifier.