MKIII Norton and JPN charging,

From 1975 these two machines had a unique high output charging system supposed to be able to up to 15Amp at 6000rpm (single phase). When designed, appeared quite clever, but time has shown up the systems limitations and gives us better ways to regulate the alternator output for battery charging.
Firstly a brief description of the 'standard' system, this will allow you to understand the differences of the MKIII. All of the other Commandos ever made had the RM21 alternator fitted (this includes the vast majority of British motorcycles from the mid 1960s to the mid 80s).
The RM21 is in effect a coil of wire with a magnet whirring around 'inside it' this produces 120 Watts of AC electricity which has to be rectified to DC to charge the battery and maintain the bikes electrical systems (ignition, lights, [sat nav. If you must]). This coil of wire does not connect to the earth of the bike either. (This point is crucial as to correct charging ie earth connection in the alternator=fault mode) The rotor in ALL of these alternator systems is exactly the same, a six magnet rotor of 74mm outside diameter, 19mm inside. There is different part numbers, the early 'exploding' ones had a number of 54212006
The RM21 used a very traditional silicon rectifier bridge rectifier (black painted plates) modern units use the square encapsulated version.
Regulation is/was done with the Zener diode (Positive earth in the Norton case) this Zener having a capacity of 100W.
The Zener diode at 100W can cope with the 120W RM21 if we remember that we have an ignition and battery charge load of about 20W each ie the Zener then has to deal with a nominal 80W in worst case.
This is where the fun starts. The RM21 was replaced with the RM23-47239 (one of several Lucas part numbers). Being rated at approx180W this outstripped the single Zener so an alternative regulation had to be found. we now find the double Zener circuit as in the MKIII (JPN) where two Zeners are fitted within the bridge circuit and clip the AC side of the waveform. As these Zeners are working in different parts of the circuit they do not have to be matched in any way, but of course we now we might have 200W of regulation capacity.
Good news and bad news. The good is easy fit to fit the second Zener on the other Z plate. The bad news-if at any time you lose a Zener, as it was part of the bridge you drop to half charge power. Also as the Zener was nominally designed for 14.7V the DC battery charge voltage, it now being on the AC side of things it makes the DC now 0.7 volt lower (1 diode drop) so the battery charge voltage on these bikes is always a bit on the low side. As Zener voltages are rather variable, then searching out and fitting Zeners at15V or more can occasionally be useful. While another 'trick' I heartily recommend is replacing

the strange ‘half’ (49181) rectifier with a full wave (encapsulated) bridge rectifier. This rectifier is a decent lot cheaper than the fancy half rectifier and should any or all the Zeners ‘disappear’ then instead of the battery going on to half charge it goes onto slightly increased charge! Of course knowing this is always useful so monitoring the battery voltage is a good idea and should you be embarrassed with overcharging then leave the lights on!
The other modern answer to this ‘problem’ is to use the regulator /rectifier as they can easily handle the higher output alternator.
There was one other regulation system that needs mentioning that was used on high output alternators of this period. The matched pair of Zeners. In the electronic world having two Zener diodes connected in parallel is taboo! As invariable one will do all the work and over heat-fail then the second one does the job-over heats and it fails. But Lucas as we know do things ‘their way’ so the idea of matching the specific voltage of a couple Zeners within 0.1V would seem to allow us to get away with it. In fact Mistral Engineering in the mid 70s and into the 80s put together a high output 3 phase alternator kit that used the matched Zeners (on the DC side) as the regulation system. The RM 24, 3 phase stator (9 pole pieces) used a 25 Amp 3 phase plate type rectifier a slightly special loom and a pair of these Zeners matched within 0.1 volt. The system worked quite well and will still do so. Unfortunately there is a belief, quite unfounded, that the Zener diode system of battery regulation is ‘old hat’ but the result with regard your battery charge voltage can be just as good with a Zener as opposed to the new fangled regulator/rectifier. The wiring can be simplified in this area with the reg/rect but the charge voltage will nominally be the same.

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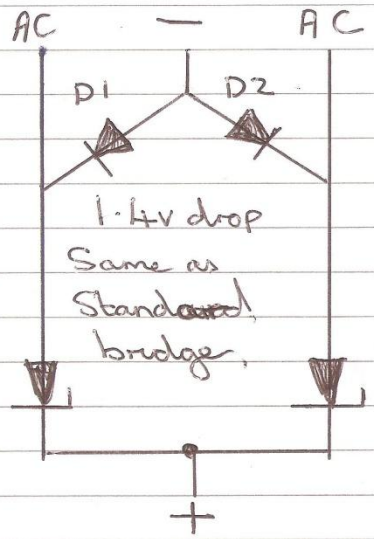

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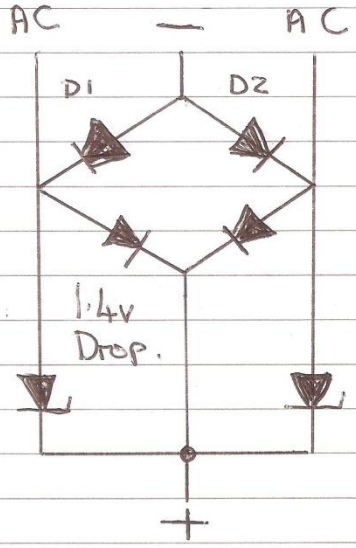

Zener = 5A at 15v = 75w
EACH Zener takes full Overcurrent for a half cycle ∴ Pulsed = Reduced Heat / Mean Wattage
∴ Each Zener Average ½ Wattage each.

Cir X one Zener open Cir = Half Wave unregulated
one Zener Short Cir = Half Wave regulated
Both Zener open or Short = NO output

Cir Y one Zener open cir = Full Wave Regulated for half cycle
one Zener Short Cir = Half Wave Regulated
Both Zener open Cir = Full Wave unRegulated.
Both Zener Short Cir = NO output.

Cir X and Y D1 or D2 open Cir = Half Wave regulated
D1 and D2 open Cir = NO output
D1 and D2 Short Cir = NO output.

Zeners Monitors battery voltage only When alternator is running. D1+D2 acts as Switch
If battery disconnected Zeners damps Alternator output

COURTESY PAUL LITTLE