



- 10g charging indicator light ———— 42 regulator, pin D+
- 28-2 fuse no.2, pin 15 ————
- 37-15 ignition switch, pin 15 ————
- 40 battery, pin 30 41 starter, pin 30
- 43 alternator, pin B+
- 37-30 ignition switch, pin 30

Alternator Operation

1. Initial state

The excitation winding rotates and induces current in the three strands, which are connected to the battery via the plus and minus power diodes and the connections B + and B-. B +, in turn, is connected to D + via the ignition switch and the control lamp. D + is fed by three (smaller) exciter diodes that are connected in parallel to the plus diodes. D + forms the feedback and power supply to the controller, which controls the field winding via DF.

2. Pre-excitation current circuit

When we turn on the ignition and start. At the starting speed, not enough voltage would be generated in the generator because the excitation from the rotor would be too low. This would have to be set in motion there by the residual magnetism, which, however, is deliberately kept low by design in order to enable the full control range to almost zero control in normal operation. The energy for the excitation winding comes from the battery during the starting process via the charge control lamp or a corresponding resistor (external excitation).

3. Excitation current circuit

We have an excitation circuit if the voltage exceeds the 0.7 V on the excitation diodes plus the 0.7 V of the power diodes connected in series, one can assume that it is somewhere between starting and engine idling. In this situation, the excitation diodes provide enough voltage for excitation, but it is not yet sufficient for the transition to the power diodes to charge the battery. In this situation one of the three strands always wins the upper hand for two 60 ° angles when supplying positive current. The same, of course, on the minus side. Between two 60 ° phases, the current alternates between the plus and minus diodes.

4. Consumer circuit

Now the alternator produces enough power to charge the battery or send electricity to the consumers. This continues until the regulator switches off periodically because the set voltage is exceeded, thereby limiting it.

Source and Animation: https://www.kfz-tech.de/Engl/Biblio/Batterie_Generator/GenSpRegler2.htm

A little theory would be good for troubleshooting.

The charge indicator light shows minus from the instrument cluster and two pluses:

- Once from fuse 2, i.e. switched plus from the ignition lock, the indicator charging light lights up when the ignition is switched on and
- From terminal D+ of the regulator (D+ from the alternator is also present here), i.e. when the engine is running and the alternator is supplying voltage, the indicator charging light switches off, as it then gets positive twice. A current flows along a potential difference (voltage difference). That is exactly the function of the indicator charging light - to show a voltage difference. The larger this is, the brighter the indicator charging light shines. For example, an indicator charging light glows during operation if individual diodes in the alternator are defective.
- When idle (ignition OFF), there is no voltage on the indicator charging light and it does not light up. If you switch on the ignition, the indicator charging light Plus gets the ignition lock and lights up. That's the theory, but why does the indicator charging light still light up when idle? She gets plus from another place!

If you look at the wiring diagram of an alternator or that of our vehicle, then the current in idle state could come from:

- A defect in the instrument cluster (cross connection, short circuit): Rather unlikely, as it would then always light up.
- A defect in the ignition lock. Indicator charging light gets plus via terminal 30.
- A defective plus diode that passes the voltage through the junction to the excitation diodes and on to D+. In this case, the battery should not be charged, at least the indicator charging light would then have to glow during operation.

I would measure the voltage at rest on D+ of the lima and regulator, with and without the current from fuse 2. (Pull the fuse). It would also be important to know what happened before the error (repairs, new installations, etc.).