ZENER DIODE

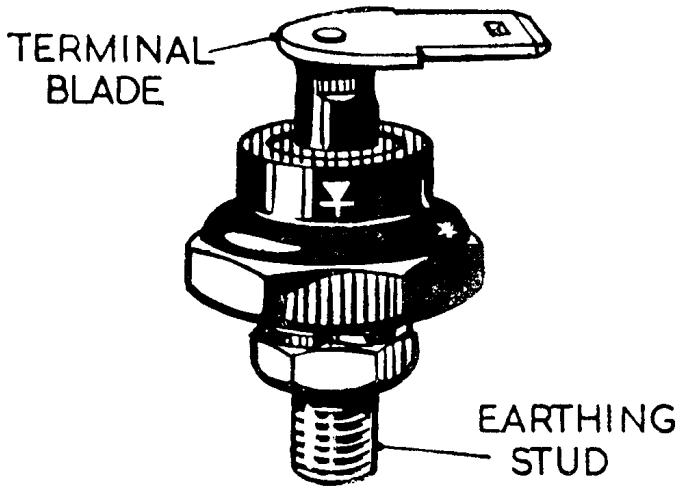
99. Description

The Zener Diode output regulating system uses all the coils of the 6-coil alternator connected permanently across the rectifier, provides automatic control of the charging current. It will only operate successfully on a 12 volt system where it is connected in parallel with the battery as shown in the wiring diagram. The Diode may be connected through the ignition switch or direct to the centre terminal of the rectifier.

Assuming the battery is in a low state of charge its terminal voltage (the same voltage is across the Diode) will also be low, therefore the maximum charging current will flow into the battery from the alternator. At first none of the current is by-passed by the Diode because of it being non-conducting due to the low battery terminal volts. However, as the battery is quickly restored to a full state of charge, the system voltage rises until at 13.5 volts the Zener Diode becomes partially conducting, thereby providing an alternative path for a small part of the charging current. Small increases in battery voltage result in large increases in Zener conductivity until, at approximately 15 volts about 5 amperes of the alternator output is by-passing the battery. The battery will continue to receive only a portion of the alternator output as long as the system voltage is relatively high.

Depression of the system voltage, due to the use of headlamp or other lighting equipment, causes the Zener Diode current to decrease and the balance to be diverted and consumed by the component in use.

If the electrical loading is sufficient to cause the system voltage to fall to 13.5 volts, the Zener Diode will revert to a high resistance state of non-conductivity and the full generated output will go to meet the demands of the battery.



ZENER DIODE
Fig. 33

100. Maintenance

The Zener Diode is mounted on an aluminium heat sink. Providing the Diode and the heat sink are kept clean, and provided with an adequate airflow, to ensure maximum efficiency, and provided a firm flat "metal to metal" contact is maintained between the base of the Diode and the surface of the heat sink, to ensure adequate heat flow, no maintenance will be necessary.

101. Test Procedure

(Procedure for testing on the Machine)

The test procedure given below can be used when it is required to check the performance of the Zener Diode type ZD715 whilst it is in position on the machine.

Good quality moving coil meters should be used when testing. The voltmeter should have a scale 0–18, and the ammeter 0–5 amps min. The test procedure is as follows:—

(1) Disconnect the cable from the Zener Diode and connect ammeter (in series) between the Diode Lucar terminal and cable previously disconnected. The ammeter red or positive lead must connect to the Diode Lucar terminal.

(2) Connect voltmeter across Zener Diode and heat sink. The red or positive lead must connect to the heat sink which is earthed to the frame of the machine by its fixing bolts and a separate earth lead. The black lead connects to the Zener Lucar terminal.

(3) Start the engine, ensure that all lights are off, and gradually increase engine speed while at the same time observing both meters:—

(*a*) the series connected ammeter must indicate zero amps, up to 12.75 volts, which will be indicated on the shunt connected voltmeter as engine speed is slowly increased.

(*b*) increase engine speed still further, until Zener current indicated on ammeter is 2.0 amp. At this value the Zener voltage should be 13.5 volts to 15.3 volts.

TEST CONCLUSIONS:—

If the ammeter in test (*a*) registers any current at all before the voltmeter indicates 13.0 volts, then a replacement Zener Diode must be fitted.

If test (*a*) is satisfactory but in test (*b*) a higher voltage than that stated is registered on the voltmeter, before the ammeter indicates 2.0 amp., then a replacement Zener Diode must be fitted.

102. Zener Diode Location

The Zener Diode is mounted in front of the right hand rear suspension unit. The aluminium heat sink is finned to assist cooling and is secured to the frame by a bracket and bolt. See Fig. 37.