# 2CV BATTERY CHARGING CIRCUIT

## Revision 3

By Graeme Dennes

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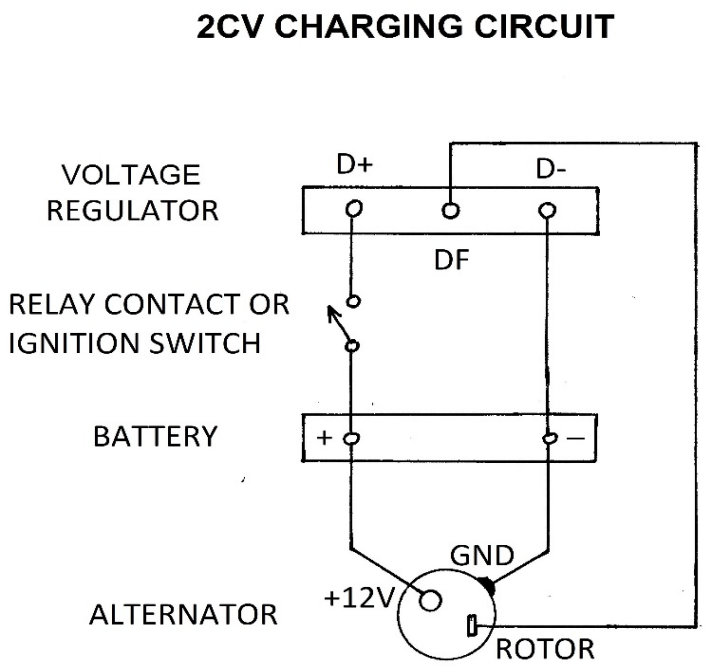
This article describes the battery charging arrangements used in a 2CV fitted with an alternator. The 2CV charging system consists essentially of the battery, the voltage regulator and the alternator. The whole purpose of these three components is to keep the battery in a fully charged state and to maximise the life of the battery. Although charging circuits in general can often be quite complex, there are in fact very few components involved in the 2CV charging circuit, as Figure 1 below shows. It is the simplest possible arrangement.




The 2CV voltage regulator has three connection terminals: D+ (Dynamo+), DF (Dynamo Field) and D– (Dynamo–).

The battery has two connections: the positive (+) post and the negative (–) post.

The alternator has three connections: +12V (Battery +), Ground (Battery –) and Rotor (a.k.a. Exciter)

*Fig. 1*

When the ignition switch is ON, the regulator's D+ terminal is connected to the battery + post via either a relay contact (if a relay is fitted) or via the ignition switch.

Voltage Regulator:
The purpose of the voltage regulator is to maintain a constant voltage across the battery posts at all driving times, irrespective of engine speed, electrical loading on the battery or state of charge of the battery. The voltage is maintained at the regulator's voltage set point.

Voltage Set Point:
The voltage set point is a design parameter of a voltage regulator. It is the voltage which the regulator aims to maintain across the battery posts. We'll consider the application of the Bosch RE57 voltage regulator as an example. This regulator has a voltage set point of 14.2V, which is the optimum charging voltage for the standard lead-acid battery, i.e., the optimum voltage to maintain across the battery posts during vehicle operation. The job of the regulator is to maintain that voltage across the battery posts.

*Fig. 2 2CV Alternator*

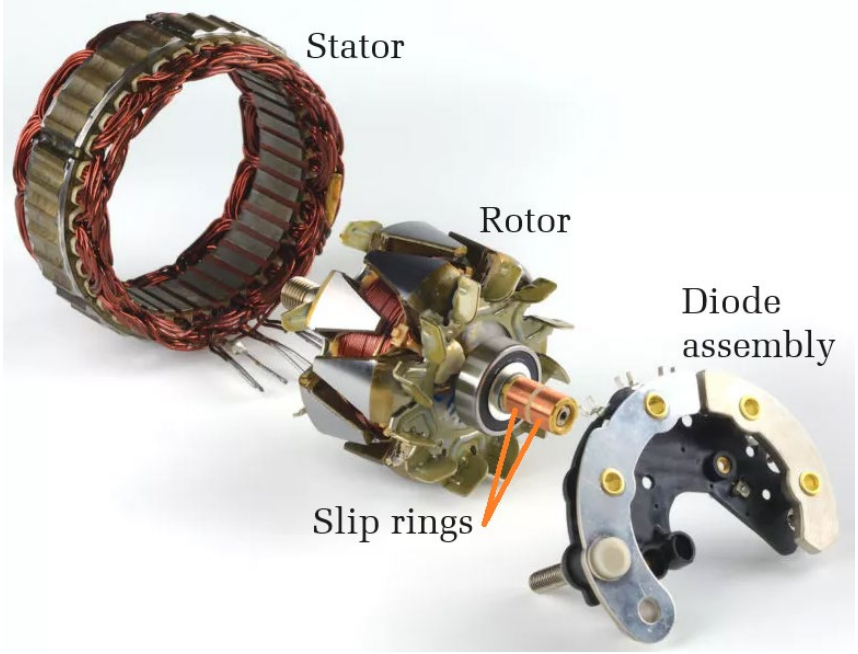



*Fig. 3 Alternator internals*

Circuit Operation:
The voltage across the battery is controlled by the alternator, the alternator voltage is controlled by the regulator, and the regulator is controlled by the battery voltage! It's an automatic level control function operating within a feedback loop.

During vehicle operations, the voltage regulator is continually sensing the battery voltage across its D+ and D– terminals and comparing it with its voltage set point. If the voltage regulator senses that the battery voltage is lower than the voltage set point, i.e., lower than 14.2V, which happens when, say, the headlights are turned on and the battery voltage drops a little due to the headlight current, the voltage regulator responds by increasing the control voltage at its DF terminal. This increases the voltage at the alternator rotor terminal, which causes the alternator's output voltage to rise, which increases the voltage across the battery posts and across the regulator's D+ and D– terminals, until the battery is (again) being charged at the optimum voltage (the voltage set point) of 14.2V as sensed by the regulator's D+ and D– terminals.

Conversely, if the regulator senses that the battery voltage is higher than the voltage set point, which happens when, say, the headlights are switched off and the battery voltage rises a little, the voltage regulator responds by decreasing the control voltage at its DF terminal. This decreases the voltage at the alternator rotor terminal, which causes the alternator's output voltage to decrease, which decreases the voltage across the battery posts and across the regulator's D+ and D– terminals, until the battery is (once again) being charged at the optimum voltage of 14.2V as sensed by the regulator's D+ and D– terminals.

This is the fundamental way the battery, the alternator and the voltage regulator operate to maintain the optimum voltage across the battery posts to maximise the life of the battery.

As a simple check, with a fully charged battery, if the engine speed is increased to perhaps two thousand (or higher) RPM, a multimeter connected *directly across the battery posts* will measure a DC voltage equal to the regulator's voltage set point, i.e., a DC voltage of 14.2V. *At no time should the battery voltage rise above the regulator's voltage set point of 14.2V, regardless of engine RPM.* If it does, something is very wrong.

In summary, that's how the voltage regulator operates to exercise control over the alternator output voltage so the battery is always being optimally charged. It's all accommodated automatically by the voltage regulator. It's also conditional upon the voltage regulator operating to its specifications and the integrity of the wiring and the wiring connections, including crimp connectors.

Any failings within the wiring connections or any additional circuit resistances in the wiring at Figure 1 *will* result in battery and battery charging problems, including an overcharged battery! Dead set! Refer to the writer's article, *2CV Battery Problems Solved* for further information on ensuring the voltage across the battery posts never rises above the voltage set point of the regulator (14.2V).

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FINAL STATEMENT

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from which photos/drawings/diagrams have been sourced.



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