

# How do automotive alternators work

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Under the hood, an alternator looks like a small cylindrical generator. You will typically find it bolted to the engine. A car alternator, along with the battery and voltage regulator, is one of three main parts of a vehicle's electric charging system. What an alternator does is supply electricity to be stored in a vehicle's battery. It is the alternator's function to take in mechanical power from a drive belt or serpentine belt connected to the engine's crankshaft pulley and then convert this mechanical energy into electricity.

Along the exterior of the alternator is a pulley driven by a drive or serpentine belt. The engine's crankshaft pulley powers the belt, which spins the alternator pulley. The movement from the alternator pulley allows the vehicle's alternator to function by providing mechanical energy it can convert into electrical energy.

The rotor is a cylindrical part attached to a metal shaft that is spun by the alternator's drive belt. The rotor has a triangle pattern (called triangle finger poles) all around the outer circumference. These triangles are magnetic and have alternating north and south orientations around the rotor.

As the alternator rotor is energized, it becomes an electromagnet at its core.

Attached to the interior of the stator is a series of 3 copper wire windings. As the magnetized rotor spins, alternating current is induced in the stator windings.

While you may think you can't have too much of a good thing, too much voltage can actually damage your car's battery and other electronics. This is where the voltage regulator comes into play. The voltage regulator is the part of an alternator used to control the electrical output. The voltage regulator moderates the electricity creating the electromagnet in the rotor into the desired alternator output.

An alternator's stator creates an Alternating Charge (AC) charge, but car batteries are powered by a Direct Current (DC) charge. The role of a rectifier is to convert the alternating electric charge into direct power that's compatible with the vehicle's battery.

Rectifiers use a series of diodes, a semiconductor device, to take in the AC charge and redirect the current into

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one direction of flow. By restricting the flow of power to one direction, the rectifier converts the AC charge into a DC charge the car battery can accept.

While the battery is essential for starting your car when it's off, the alternator keeps your car alive when the engine is running. The alternator powers most of the car's electronic components while you're driving around or idling, including your headlights, electric steering, power windows, windshield wipers, heated seats, dashboard instruments, and radio. The alternator supplies all of them with direct current (DC) energy. Your alternator is also responsible for charging your car battery while driving.

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