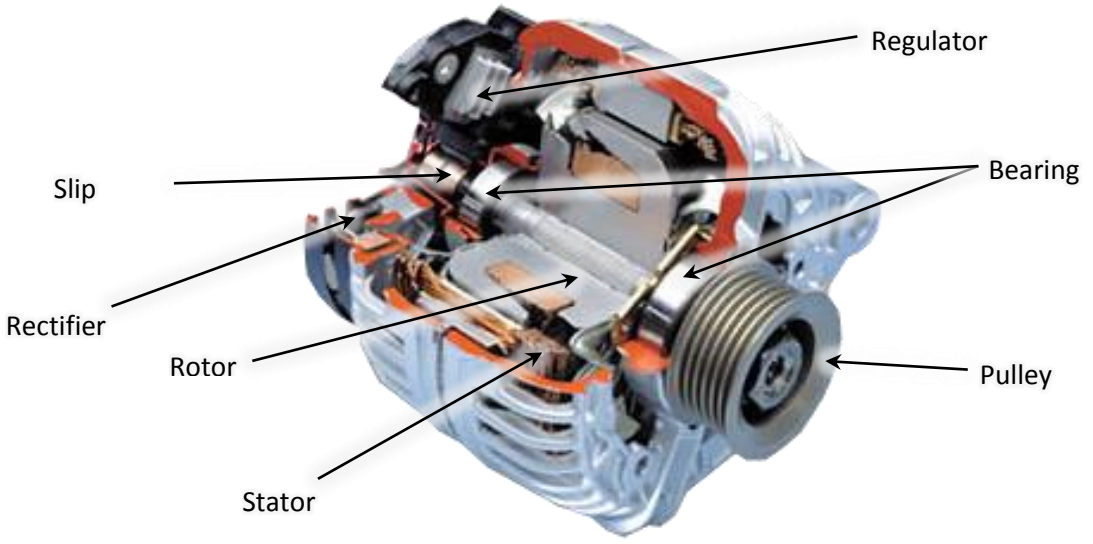
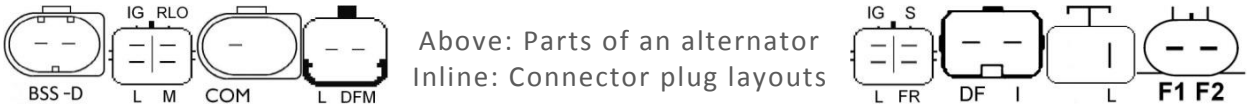
How It Works – Alternator





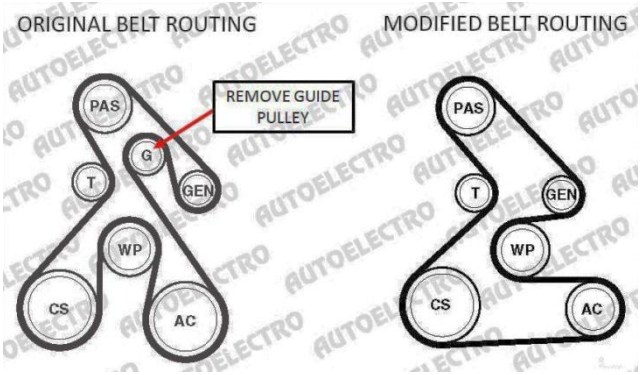
Above: Parts of an alternator
Inline: Connector plug layouts

An alternator works together with the battery to supply power when the vehicle is running. The output of an alternator is direct current (DC). When the alternator pulley is rotated alternating current (AC) passes through a magnetic field an electrical current is generated and converted to DC via the rectifier. The current is controlled through the voltage regulator in order to cope with the varying electrical vehicle loads.

Early vehicles have conventional alternators fitted which only require a battery supply (12v) and a warning light circuit. These alternators begin to charge when the vehicle is started and the battery warning light goes off.

Technology is driving change from the early days of externally regulated alternators; to the latest advanced CANBUS controlled units. Alternators originally used to be externally regulated and were only used to generate current which was controlled by an external regulator. The introduction of a built in regulator with a warning light circuit in the 1900s, used the warning light to excite the alternator and start the charging process. As vehicles evolved and electrical systems started becoming more complex, a field or digital field regulator was introduced. This regulator would monitor information between the alternator and vehicle ECU regarding the charge rate. Many modern vehicles adopted a load request type charging system with the introduction of smart charge systems and CANBUS systems which are now widely being used. These systems are controlled by the vehicle ECU. As the vehicle demands more load the ECU sends a signal to the alternator requesting it to start charging. The alternator has to cope with varying electrical

loads and adjust its charge rate accordingly. These days it is easy for a CANBUS controlled alternator to be misdiagnosed as faulty if a charging fault is experienced on the vehicle; however more often than not no fault is found with the alternator. **(More information regarding regulator terminals is available via our website)**



Some Honda alternators require the removal of a guide pulley and the installation of a shorter belt to reduce the amount of tension within the drive belt system.

The majority of late vehicles are now fitted with an overrunning pulley (OAD De-coupler Pulley) rather than a conventional pulley. The overrunning pulley helps synchronize the drive belt system to improve engine efficiency and reduce noise, harshness and vibration. As engine speed slows down the drive belt can slip, the advantage of the overrunning pulley is that the clutch mechanism reduces the speed in a more controlled manner reducing the amount of slippage created on the decrease of the engine speed. The main advantages of an overrunning pulley are:

- Reduction of belt vibration
- Reduction of forced peaks in drive belt
- Reduction of movement in the tensioner
- Reduction of belt wear
- Reduction in the strain within the drive belt system

Alternator pulleys commonly fail due to a tensioning fault within the drive belt system. Issues with components such as the failure of the crank pulley can result in excessive vibration within the drive belt system resulting in abnormal load being applied to the alternator pulley for a prolonged period. Other reasons such as incorrect routing of the drive belt or a fault with the tensioner can cause excessive load being exerted to the alternator.

Glossary

Regulator	The voltage regulator controls the amount of power distributed from the alternator to the battery in order to control the charging process. Regulators are designed with different functions and work depending on their specification. Please see our regulator terminal guide for more information.
Rectifier	The rectifier is used to convert current from AC to DC during the charging process.
Rotor, Slip Rings and brushes	The rotor is the spinning mass inside the alternator rotating via the pulley and drive belt system. The rotor acts as a spinning electromagnet and is supplied power via the slip rings and brushes.
Stator	The stator consists of several coils of wire wound through an iron ring. The stator sits outside the rotor, when a magnetic field is created the electrical current is made.
Bearings	The bearings are designed to support the rotation of the rotor shaft.
Pulley	The pulley is connected to the rotor shaft and the drive belt system. Rotation created by the engine the drive belt system turns the pulley beginning the charging process.