Starter Motor

The starter motor is like any other electrical motor but it is designed to work under high electrical overloads and produces very high power. Due to this, the motor can operate for short durations. High current is needed to operate it that generates heat. Time is also required to dissipate this heat. Therefore, it is advisable that the motorbe given enough gaps between more than one starting attempts.

The motor has got field coils with pole shoes, armature and a housing that encloses them. Apart from these it has brushes, bushings that make its operation efficient.

The field coils and pole shoes produce strong stationary electromagnetic fields as current is passed through them. Magnetic polarity (N or S) depends upon the direction in which the current flows. The magnetic fields produced are opposite in nature.

The armature is located between drive and end frames. It has windings and the commutator mounted on the armature shaft. The windings are made of a number of coils of a single loop each. These are insulated from each other and fit into slots in the armature shaft. The commutator has heavy copper segments surrounding the shaft but are insulated from each other and the shaft. The armature is surrounded by field coils. Current is supplied to armature and it produces magnetic field in each conductor. The magnetic fields are also produced by field coils. The reaction between these magnetic fields causes the rotation of armature. The rotation is transferred to crankshaft of the engine through armature shaft. This causes crankingof engine.

The current from field coils to the armature is transferred through brushes. These brushes are held with the help of springs against the commutator. The brushes canbe from two to six in number for smooth motion and constant torque delivery. Figure1 represents starter motor

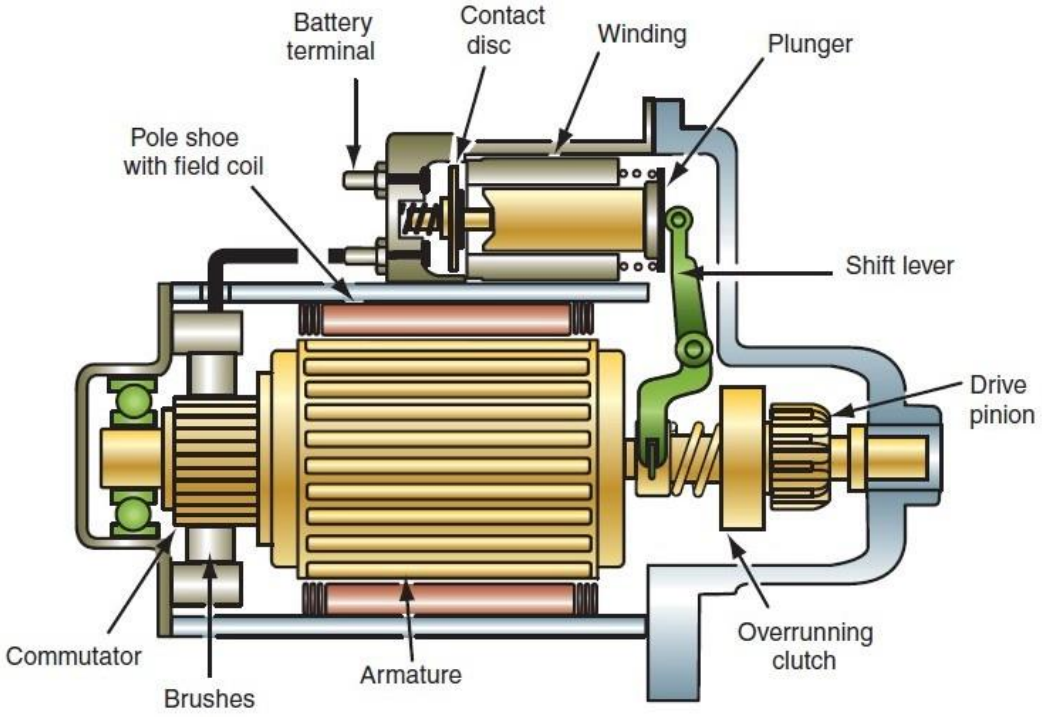

Figure 1 Starter motor

Starting System Circuits

The starter circuit is very simple in comparison with most other circuits on the modern vehicle. The voltage drop in the main supply wires is the problem with the system which is to be overcome. This problem is because of the high current required by the starter particularly under adverse starting conditions such as very low temperature. The starter is usually operated by a spring-loaded key switch, which also controls the ignition and accessories. The supply from the key switch, through a relay in many cases, causes the starter solenoid to operate and this in turn, controls the heavy current through a set of contacts. In some cases, an extra terminal on the starter solenoid provides an output while cranking, usually used to bypass adropping resistor on the ignition or fuel pump circuits. Figure 2 illustrates basic circuit for the starting system.

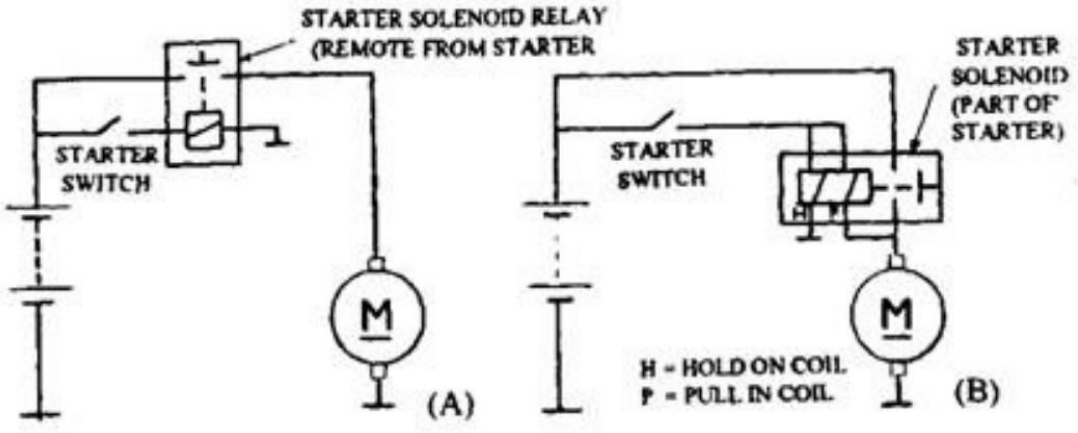

Figure. 2 Basic starting circuit. A. Inertia starter circuit. B. Pre-engaged starter circuit.

For a light vehicle engine, a typical cranking current is around 150 A, which may increase to the order of 500 A to provide the initial stalled torque. A maximum voltage drop of only 0.5 V is generally allowed between the battery and starter when the latter is operating. Using Ohm's law a maximum allowed circuit resistance can be calculated as 2.5 mfi for a 12 V supply. This is a worst situation and generally lower resistance values are used. The selection of suitable conductors in the starter circuit is highly important.