

Some Chrysler applications use separate wires for connecting to the charging and starting systems. General Motors products which use side terminal batteries require a side post connection which is encased in vinyl for additional corrosion protection.

The stackable cable system, found in heavy-duty applications, also uses an insulated conductor and allows two cables to be connected to one battery terminal. It is used most often in farm equipment, heavy-duty trucks and heavy equipment.

A switch-to-starter cable is used to connect to the starter solenoid switch when it's mounted away from the starter.

The battery jumper cable is used when connecting batteries in series on heavy-duty applications.

Servicing Battery Cables

Battery cable failure is usually the resistance to the flow of electricity. A drop of just one volt means a loss of up to 15% of the voltage available during cranking.

Replacement battery cables should be at least as large (in terms of cable size) as the original equipment. The cable size is determined by the size of the conductor, not by the outside diameter of the insulation. An exception to this rule occurs when you are replacing aluminum or copper-clad aluminum with copper conductor; in this instance, the copper equivalent will be two gage sizes smaller.

The most common source of resistance is in the cable connections. It is very important that battery cable connections be kept clean. This includes new cables, since they can gather dirt and oxidation while they are on the store shelves.

This oxidation occurs when air combines with moisture to form an insulating film. Corrosion on the cable connection results from acid vapors vented from the battery, grease, oil and dirt. Since all of these can increase resistance to the flow of electricity, care should be taken to prevent them. Connections should be as air tight as possible, and protectants, either spray sealants, heat shrink tubing or specially formulated protective compounds, may be used on the terminations.

Several types of battery cable repair ends are available for temporary repair of battery cables, ranging from a basic emergency end to quick connect ends that allow the connection to be made away from the top of the battery.

Starter Motor Assembly

The electric starter motor was invented by Charles F. Kettering in 1910. It appeared in 1912 on all Cadillacs and from that day forward, the acceptance of the gasoline engine was assured. Up until that time, many people were afraid to crank the engine by hand, or simply unable to.

The starter motor cranks the engine at approximately 200 revolutions per minute. When the engine starts running on its own, the crankshaft and flywheel ring gear are almost immediately turning at a much higher speed, and could damage the starter motor. To prevent this, the starter motor has an "overrun clutch" or starter drive which transmits torque in only one direction and turns freely in the other. As soon as the engine starts to run on its own, the overrun clutch releases the wedge rollers in the starter drive housing. This allows the pinion gear to exceed the revolutions per minute of the armature assembly, and prevents damage to the starter motor.

When the driver releases the ignition key switch from the "start" or "crank" position, electrical power is cut from the motor and a spring-loaded solenoid disengages the starter drive pinion gear from the engine flywheel ring gear.

All starters use this type of solenoid except the Ford Motorcraft "positive engagement starter." This type of starter uses a movable field pole shoe to engage the starter drive pinion gear with the flywheel ring gear.

While a starter motor is small, it can deliver tremendous torque and has a tremendous appetite for current when it attempts to turn such a heavy load as a cold engine. When the starter drive pinion gear first engages the engine flywheel ring gear, the starter motor armature shaft is essentially stalled by the static load of the engine. The initial surge of current through the starter motor may be as much as several hundred amps, and this brief surge places a