training chart manual

SECTION m

DELCOTRON® GENERATOR AND THE CHARGING SYSTEM

(10-DN SERIES)

DELCO-REMY · ANDERSON, INDIANA, U.S.A.
DIVISION OF GENERAL MOTORS CORPORATION

INTRODUCTION

The purpose of this book is to describe Delco-Remy's continuous-output diode-rectified a.c. generator, the Delcotron®—and the system in which it operates.

The first section describes the Delcotron generator—its construction and basic operating principles. This is followed by a description of the complete charging circuit which is comprised of the Battery, Delcotron Generator, Regulator, Wiring, Charge Indicator Light or Ammeter and Ignition Switch. It should be noted that two basic types of regulators are used in connection with the Delcotron generator:

Type I—This is a two-unit Delcotron regulator. It has a double-contact voltage regulator unit and a field relay and is used in conjunction with either a *Charge Indicator Light* or with an *ammeter*.

Type II—This regulator has only one unit which is a double contact voltage regulator and is used in circuits containing an *ammeter*.

The last section of this booklet discusses servicing the Delcotron generator. Basic electrical checks of the rotor, stator and diodes are covered to guide the servicemen when servicing this type of electrical power plant.

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Chart 1

The 10-DN Series Delcotron shown is typical of a variety of models that are offered by Delco-Remy. Although models are available with different outputs at idle and with a difference in maximum output performance their basic operating principles are the same.

The 10-DN Series Delcotron generator is compact in size and light in weight—approximately 10 pounds. Its high efficiency in operation makes possible more output per pound than most generators designed for today's modern vehicles.

Since the Delcotron is a high performance generator that supplies a continuous output of electrical energy at all engine operational speeds, the battery should be maintained in a higher state of charge than if a generator with no charge-at-idle were used. Consequently, the Delcotron aids in improving the performance from the entire electrical system. Excessive battery discharge will also be minimized which tends to increase battery life.

DELCOTRON® GENERATOR
(TYPICAL 10-DN SERIES)

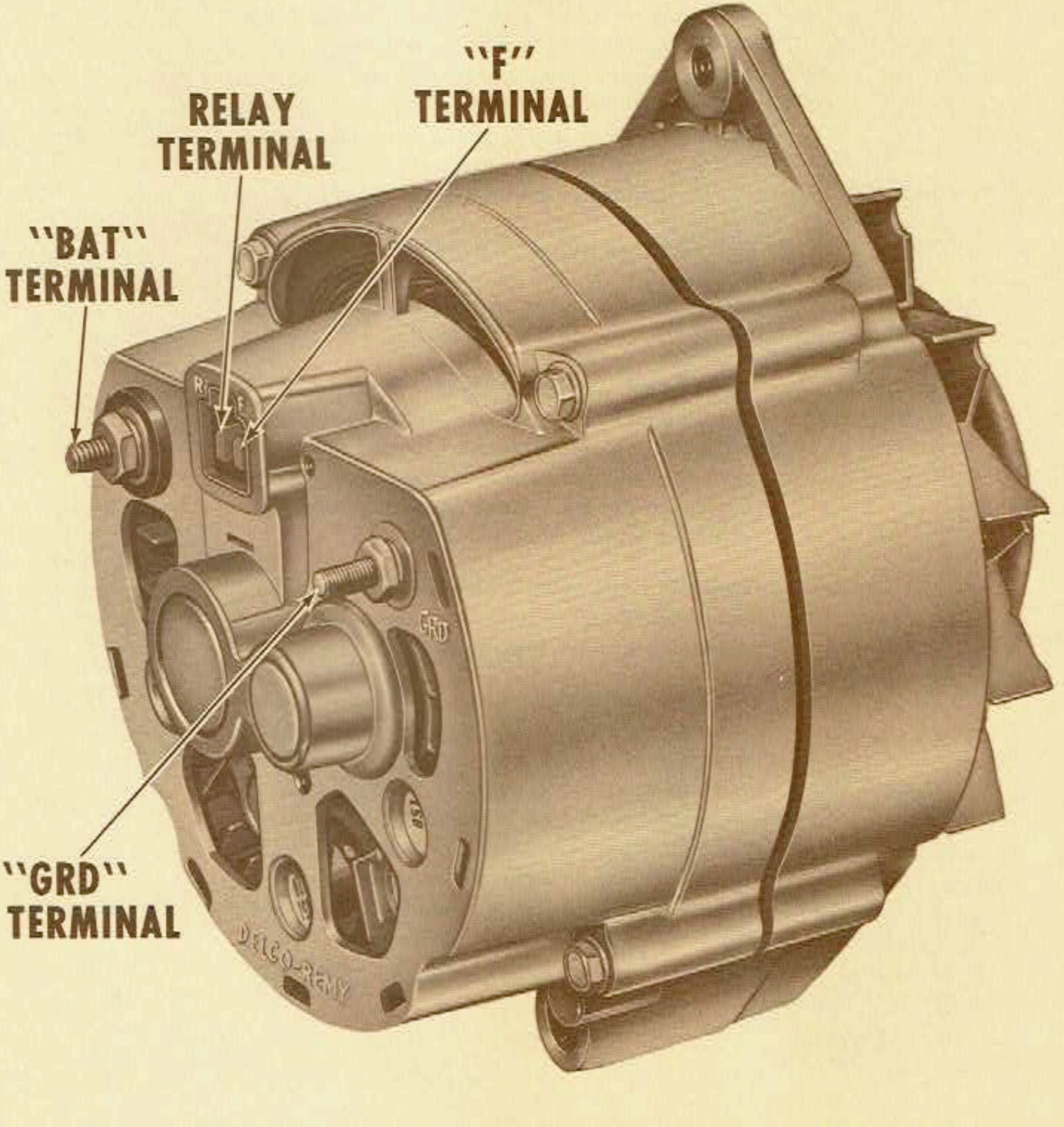


Chart 2

The Delcotron consists primarily of two end frame assemblies, a rotor assembly, and a stator assembly. The rotor assembly is supported in the drive end frame by a ball bearing and in the slip ring end frame by a roller bearing. These bearings are pre-lubricated and therefore do not require periodic lubrication. A grease-filled reservoir in the drive end frame prolongs bearing life. The roller bearing in the slip ring end frame is permanently lubricated prior to assembly into the frame.

The stator assembly is mounted between the two end frames, and consists of loops of wire wound into the slots of the laminated stator frame.

The rotor assembly contains a doughnut-shaped field coil wound onto an iron spool. The coil and spool are mounted between two iron segments with several interlacing fingers which are called "poles." These parts are held together by a press fit on the shaft.

Two slip rings, upon which the brushes ride, are mounted on one end of the rotor shaft and are attached to the leads from the field coil.

Six electronic check valves called *diodes* are located in the end frame assembly nearest the slip rings. Three of these diodes are negative and are mounted directly to the end frame. Three positive diodes are mounted into a strip called a "heat sink," which is insulated from the end frame. These diodes change the alternating or a.c. voltages developed in the stator windings to a d.c. voltage which appears at the output or "BAT" terminal on the Delcotron.

DELCOTRON GENERATOR
(TYPICAL 10-DN SERIES)

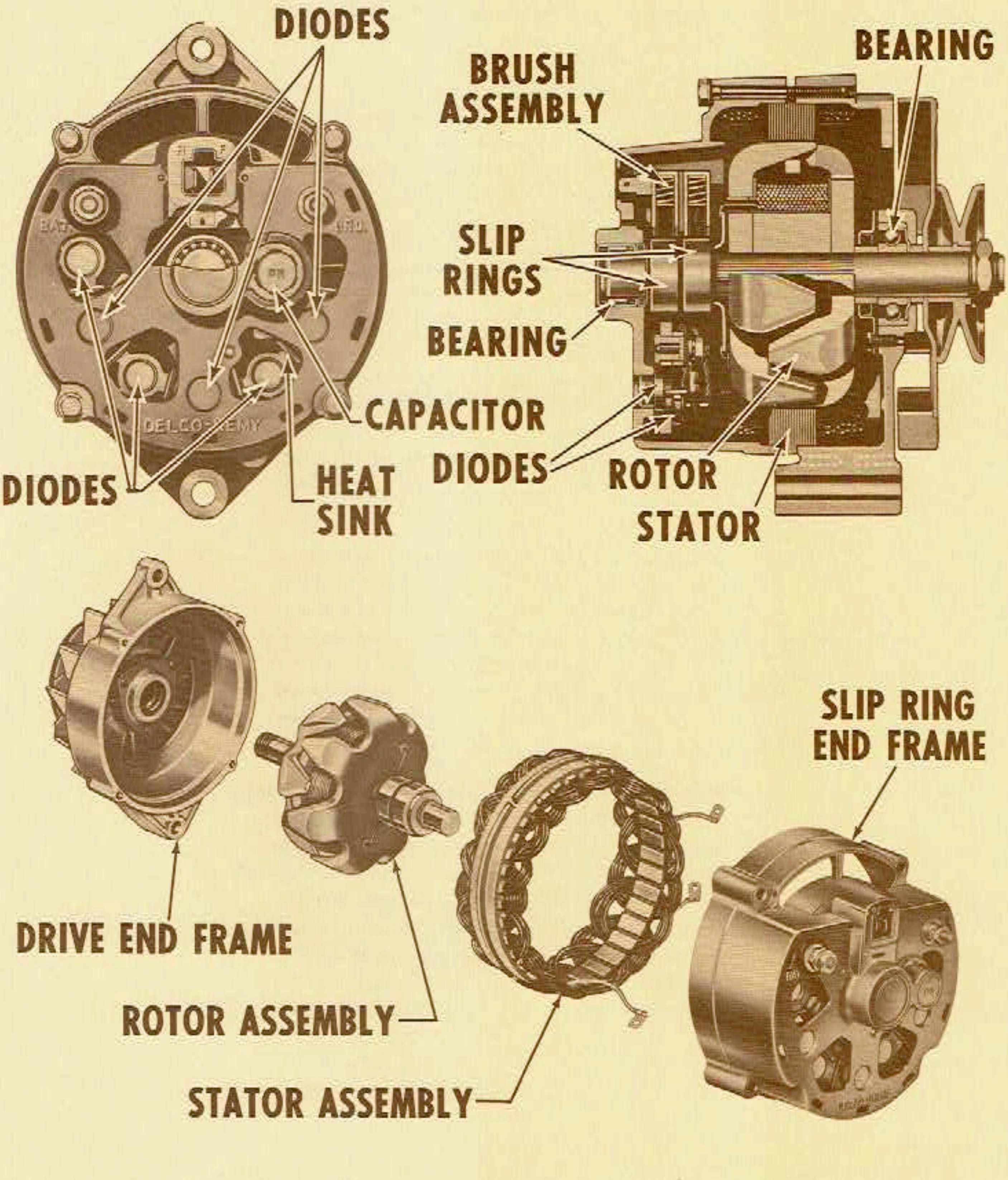


Chart 3

In order to understand the operating principles of Delcotron generators, it will be helpful to review briefly the fundamentals of electricity and magnetism.

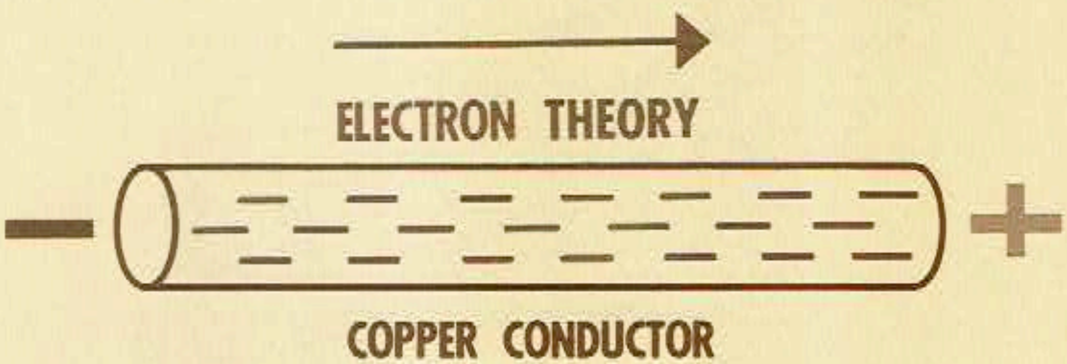
Electric current is defined as a movement of electrons through a conductor such as a copper wire. Current flow is measured in amperes, and when 6.28 billion billion electrons pass a certain point in a conductor in one second, the current flow is one ampere. Electrons, however, will not move through a conductor of their own free will. There must be some kind of force to cause the electrons to move.

The force which causes electrons to flow in a conductor is called voltage. The voltage is the difference in electrical pressure measured between two points in a circuit. Thus, using a 12-volt battery as an example, the voltage measured between the two battery posts is 12 volts.

An important concept is "voltage potential" at a certain point in the electrical circuit. This simply means the voltage or electrical pressure at a particular point with respect to another point. If the voltage potential of one post of the 12-volt battery is zero, the voltage potential at the other post is 12 volts with respect to the first post.

Another important concept is polarity. One post of a battery is said to be positive, and the other negative. By conventional theory the direction of current flow in a circuit is from the battery or generator positive terminal through the external circuit, and then back to the negative terminal of the battery or generator. This direction is opposite to the direction of electron flow.

ELECTRICAL FUNDAMENTALS



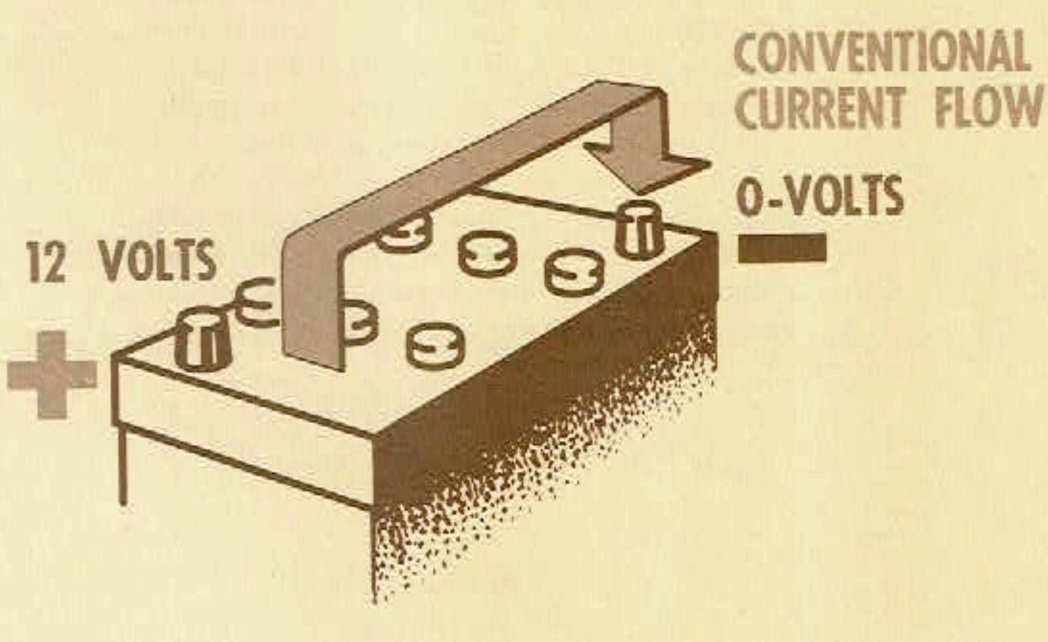


Chart 4

To understand how the Delcotron functions, a review of some electrical fundamentals is necessary. It is a well-known fact that electricity and magnetism are closely related and a brief look at their relationship follows.

When an electric current passes through a conductor, such as a copper wire, a magnetic field is created around the wire and a very weak electromagnet is formed. The magnetic field is illustrated as concentric circles around the straight wire. As the current in the wire increases, the strength or intensity of the magnetic field increases. However, the strength of the magnetic field around a straight conductor is too weak to be of value for most applications. Therefore a means of obtaining a stronger magnetic field must be found.

This is accomplished by winding the straight conductor into a series of loops to form a coil. When this is done, and the same current that was passed through the straight conductor is passed through the coil, a stronger magnetic field is produced. The magnetic field then takes the form shown in Chart 4. A North ("N") pole is produced at one end of the coil, and a South ("S") pole at the other end. The magnetic lines leave the North pole and then re-enter the coil at the South pole as shown by the arrows.

ELECTROMAGNETIC PRINCIPLES