

1935 Generator Manual

Resurrected

Part II

Courtesy Electrical Rebuilder's Assoc.

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Police Cars

A discussion of some of the conditions encountered in police car service will serve to show the wisdom of the choice of the special Delco-Remy generator with current and voltage regulation as the correct equipment for this type of service. First, the electrical load on the generator is much higher than that of the average passenger car. This necessitates a larger and better generator to carry this load, at the low speeds encountered in city police service, without drawing current from the battery.

The Delco-Remy Police Car Generator is larger in diameter, and over two inches longer than the "standard equipment" generator, and its capacity is ample for police car service. In addition, fan ventilation is provided to carry away the heat produced in the generator by the heavy current that it carries. This safety factor is insurance against the generator ever causing trouble and delay by burning out under heavy load. The fan limits the generator temperature.

Another angle to the problem is that of operating speeds. Passenger car generators are designed for the "average driver." They are designed to produce their peak output at from 35 to 40 miles an hour, as it has been proven that the "average" driver will operate his car at this speed a majority of the time.

A police car, on the other hand, has no "average" speed. It may operate at any speed from five miles an hour to 70, and usually does in almost any one-hour period. There is also a great deal of

idling with practically all of the electrical load turned on. These conditions necessitate a generator which is capable of producing a high current output at all speeds from the highest to the lowest, with enough reserve capacity to make up for the idling periods during which the battery is being discharged.

Figures 4a and 4b show two "Squad Cars" under conditions frequently encountered in winter operation. The electrical load on the generator of each car consists of the ignition coil, the gasoline gauge, two headlamps, one or more tail lamps, two or more dash lamps, the radio, and the car heater. The cars are cruising at an average speed of around ten miles an hour, at which speed the standard equipment generator has hardly started to produce current.

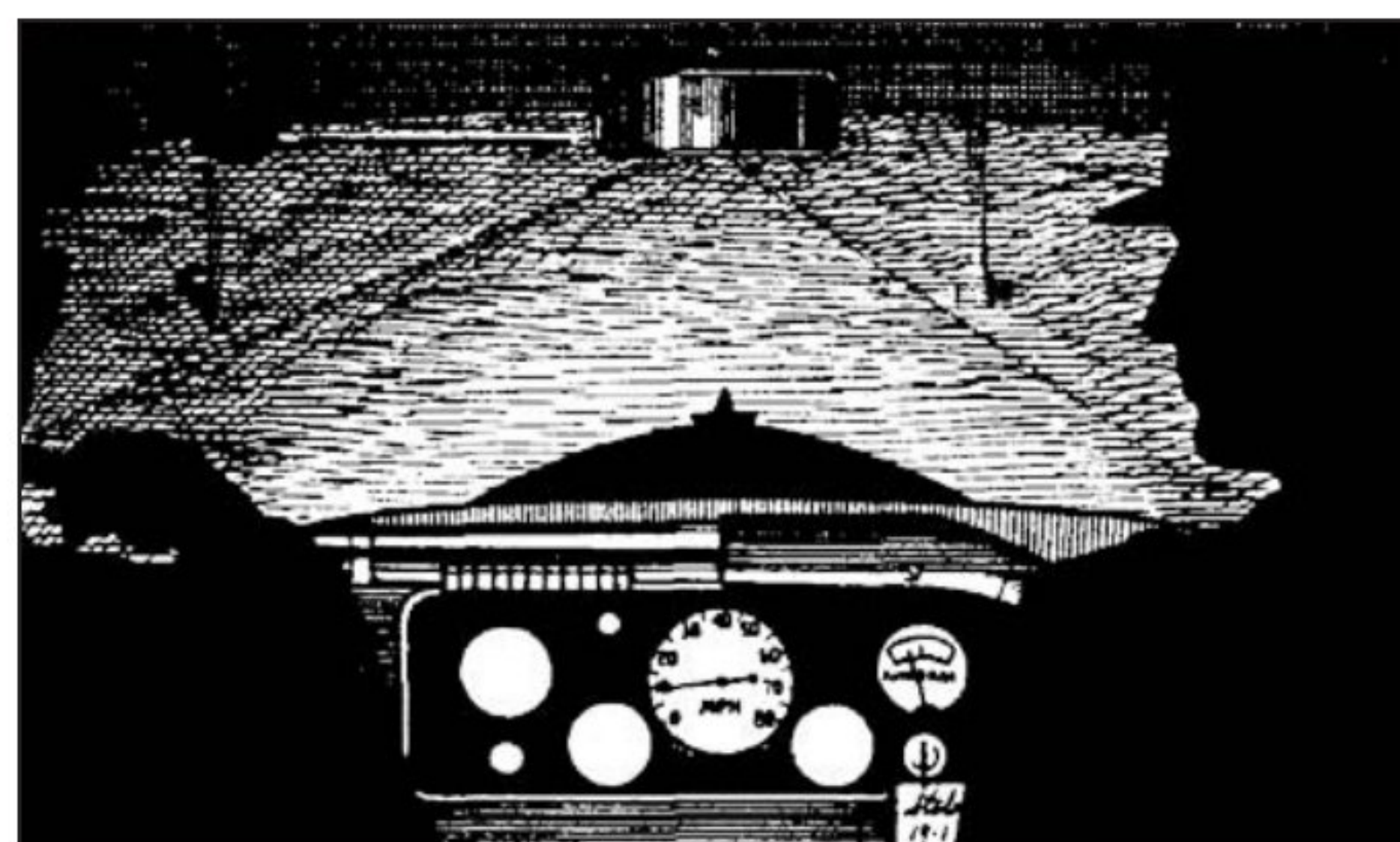


Figure 4a—Car with standard passenger car generator

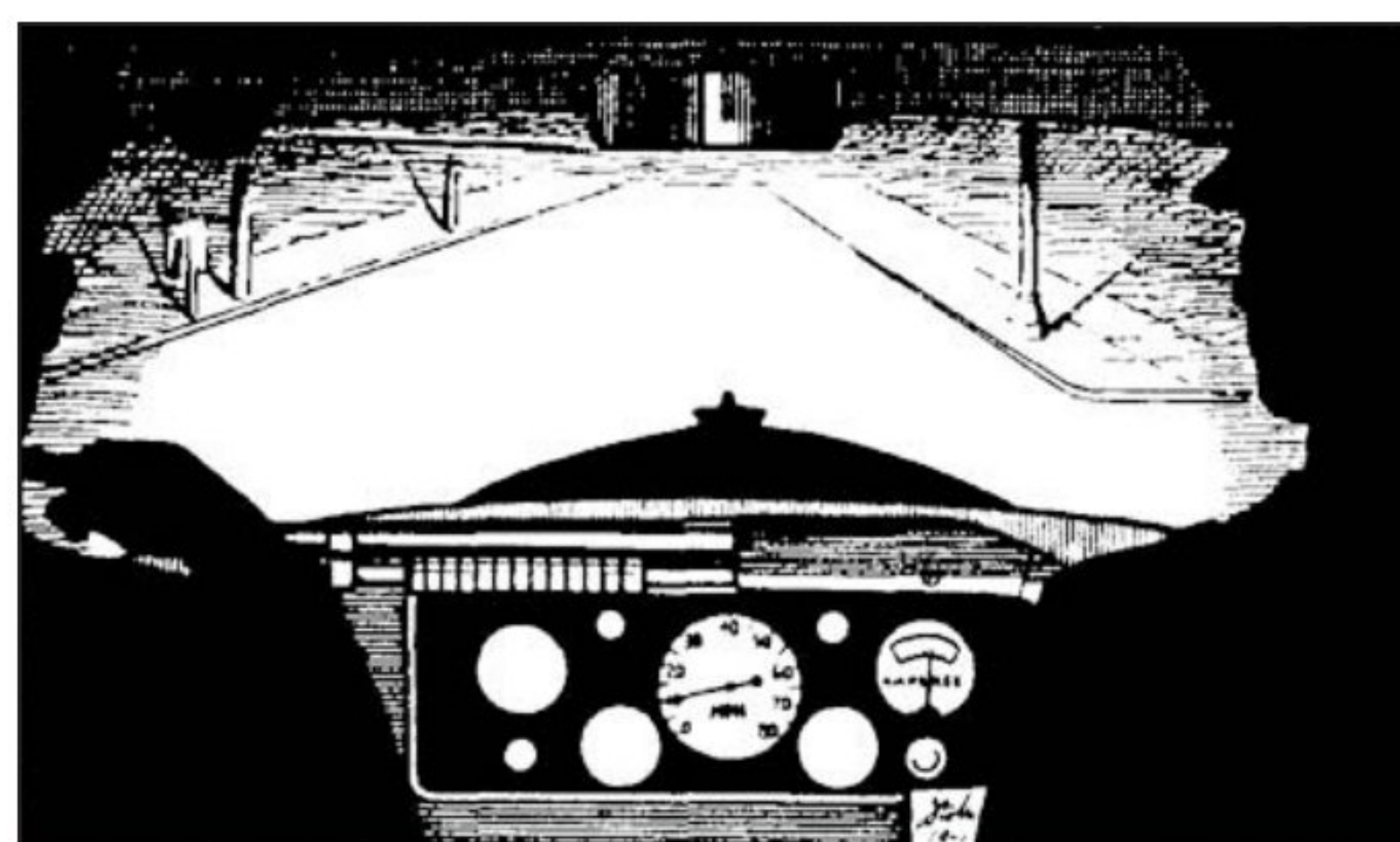


Figure 4b—Equipped with Delco-Remy police car generator

Consequently, the ammeter shows a discharge current of around 15 amperes, all of which must be supplied by the storage battery.

A cold battery can deliver only about half as much electrical energy as one which is operating under the conditions at which the battery is "rated." A battery, for instance, which is "rated" at 125-ampere hours, may produce less than 60-ampere hours in cold weather. In other words, the battery on this car will be completely "flat" in about four hours of such service.

The car equipped with the Delco-Remy Police Car Generator is cruising at the same speed as the other car, and

has the same electrical load. The generator on this car however, is designed to carry all of the load, even at this low speed, without calling for help from the battery. The ammeter shows that the generator is actually putting a small charge into the battery, even under these extreme conditions.

This small charge will replace the current used by the siren and the starting motor, both of which are normally used only for short periods, at rather infrequent intervals. However, it serves a far more important purpose to the officers in the car.

The car headlamps will produce nearly three times as much road illumination as will the lamps on the car with the standard equipment generator. This in itself is an advantage that cannot be overlooked.

Now suppose that the cars are called upon to make a fast run (Figures 5a and 5b, page 13). The speedometers show 65 or 70 miles an hour. The officers have turned on their red lights, further increasing the already severe electrical load. The standard equipment generator reached its peak output at 40 miles an hour, and has now dropped back to a point where it is scarcely better than it was at 10 miles an hour. The battery is again being heavily discharged, and the headlamps are dim and inadequate.



Figure 5a—Ammeter shows discharge at 70 M.P.H. with standard equipment generator

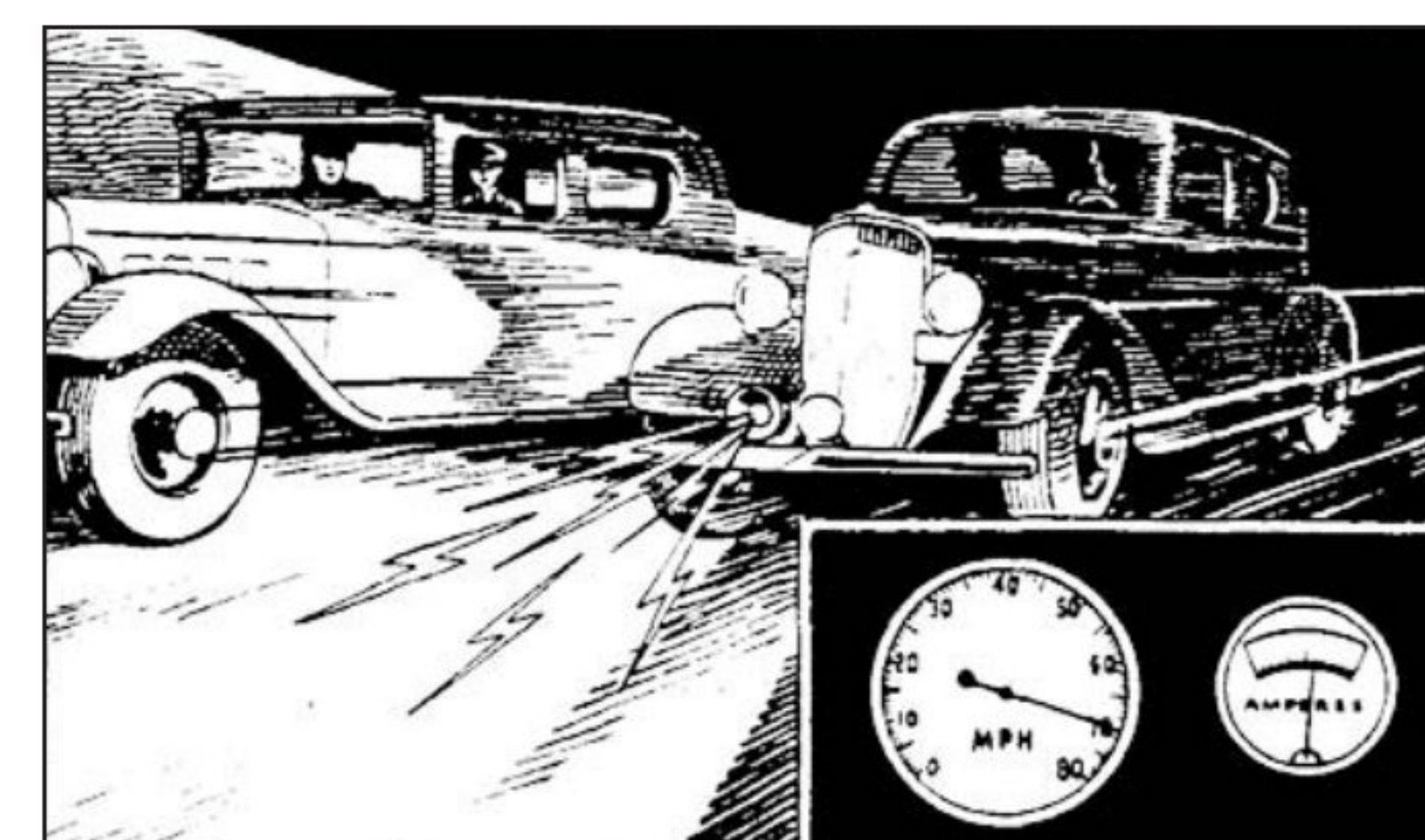


Figure 5b—Delco-Remy police car generator maintains full output at maximum car speed

On the other hand, the properly equipped car has brilliant road illumination, and the generator is still carrying the entire load. The full output of the Delco-Remy Police Car Generator is available at any car speed above 10 miles an hour. It reaches its full output at that speed, and maintains this output up to the maximum speed of the car. It is on high speed night runs that good lights are really appreciated by the man in the car. Poor lights not only handicap him in his work, but since he is first of all a human being, they tend to destroy that feeling of confidence, which is imperative for successful police work. A police officer deserves every "break" that you as a citizen or as a public official can give him.

Adequate equipment can produce high morale in any police department, which cannot help but win public approval and respect.

The yardstick of a generator is its ability to keep a charged battery charged, and to bring up a discharged battery quickly and safely. The Delco-Remy Police Car Generator, first of all is capable of preventing any discharge of the battery except during the periods when the car is idling. And secondly, it is designed to bring up a partially discharged battery, during daytime operation, quickly, by giving it a high rate charge when needed, and safely, by gradually reducing this charge rate as the battery comes up.

Another problem not commonly found in passenger car service, is the necessity for some form of voltage control or regulation introduced by the use of the heavy-duty generator. When a battery is being charged at a high rate, its voltage rises to a point where it can be very severe on light bulbs, ignition contracts, etc. Therefore, a voltage regulator must be used to limit the voltage to a safe value.

This is especially true in police service, as burned-out lamps and bad contact points can, at certain times, be very embarrassing, if not actually dangerous. High voltages are, in addition, very detrimental to the operation and dependability of radio tubes and power supplies.

Special Service Generator Features

Some of the more important features of Delco-Remy Special Service Generators are:

- a) **GENERATOR CAPACITY** is sufficient to carry the entire load of all usual equipment without drawing current from the battery. The battery is called upon only to furnish current for the starting motor, which is used for short periods at rather infrequent intervals. The generator has sufficient reserve capacity to restore the current thus used, even while carrying the full electrical load.
- b) **EXTRA INSULATION** has been provided at all vital points, in order to ensure freedom from breakdown, which is essential in heavy-duty service. All parts are required to meet the most rigid of test specifications, both as to performance and insulation.
- c) **AIR COOLING**, accomplished by means of a powerful centrifugal fan, incorporated in the generator drive pulley, allows the generator to carry its heavy load without danger of overheating. A generator thus ventilated (Figure 6) will carry a greater load than an enclosed machine, and still run from 80 degrees F to 100 degrees F cooler.

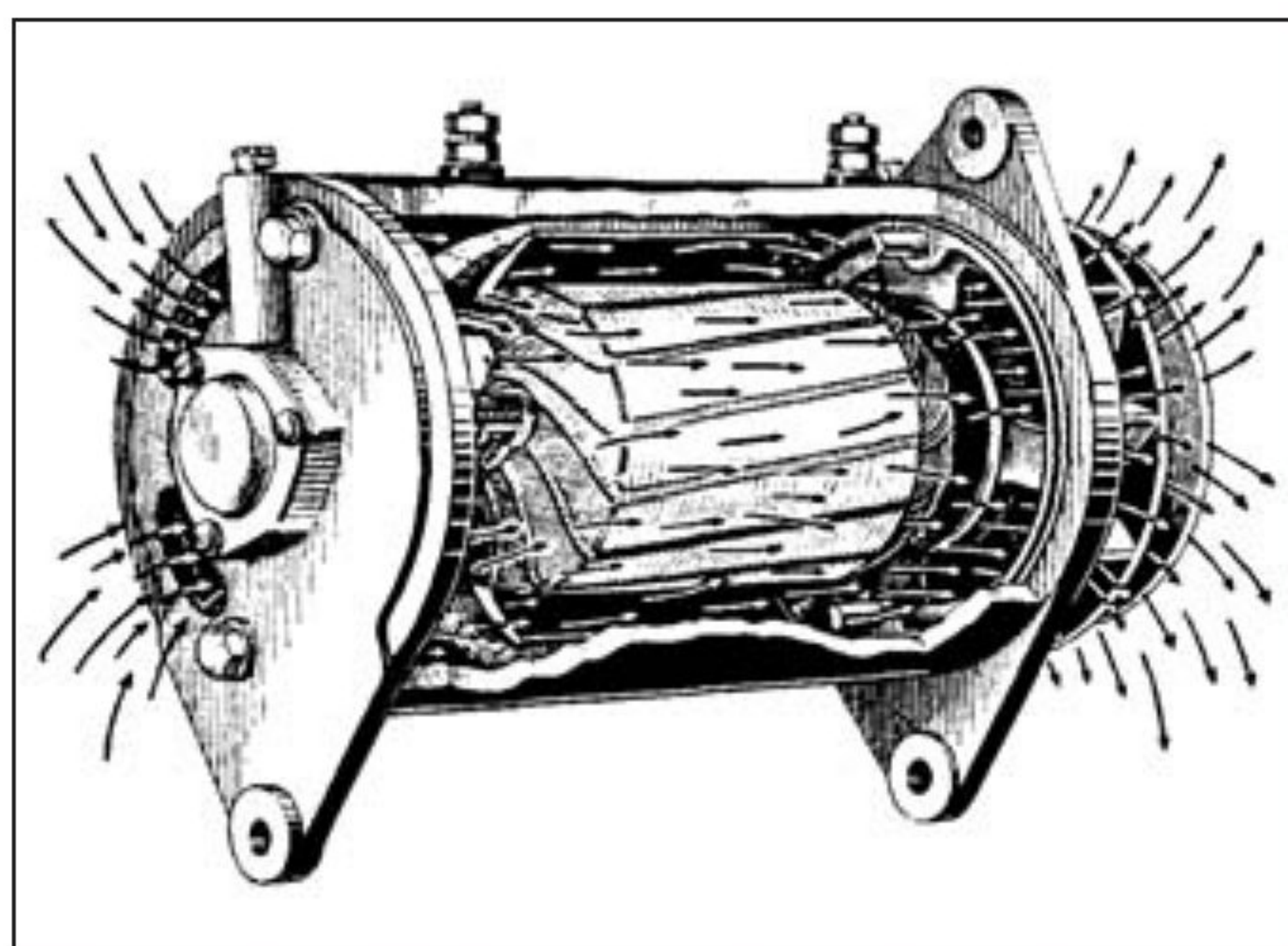


Figure 6—Cut-away view showing method of ventilation

- d) **GENERATOR VENTILATION** was pioneered by Delco-Remy, both in the heavy duty and passenger car fields. It has been almost universally adopted by other manufacturers, as witnessed by the fact that practically every new car, regardless of make, is equipped with a ventilated generator.
- e) **BALANCED ARMATURES** are achieved by using a patented formed coil winding for the arma-

ture coils. All coils have the same length of wire, and weigh the same. This gives them a natural balance and, in addition, the armature is dynamically balanced on a sensitive instrument.

Current and Voltage Regulator

The Delco-Remy regulator, used with the shunt-wound special service generators, contains a cut-out relay, a voltage regulator, and a current regulator. The cut-out relay, which functions to disconnect the battery from the generator when the engine is not running, is very similar to the standard cut-out relay, manufactured by Delco Remy, which has given satisfactory service on millions of passenger cars. However, it has been completely redesigned to carry the high output current of the heavy duty generator, and it is strictly a heavy duty unit in every respect.

The second unit is the voltage regulator, an extremely ingenious device, which has the following purpose and features:

- a) It serves to prevent excessive voltages on the headlamp bulbs and the ignition contact points.
- b) It maintains the correct voltage at the headlamps for best road illumination at all driving speeds. It is the battery voltage which determines the voltage at the headlamps and the ignition contacts. The Delco-Remy regulator limits the battery voltage to a predetermined value, above which it cannot rise, regardless of load or battery conditions.
- c) The Delco-Remy regulator permits a high rate charge for partially or completely discharged batteries, thereby bringing them up rapidly.
- d) It gradually and automatically reduces this high charging rate as the battery comes up, thereby preventing overcharging. Excessive overcharging can quickly ruin a storage battery by buckling the plates, and by causing the active material of the plates to shed.

This shedding of the plate material means a large loss of the power and capacity of the battery, while the material collecting in the bottom of the cells can completely ruin a battery by

short-circuiting the plates.

The third unit is the current regulator, which is incorporated for the following reasons:

- (a) It ensures freedom from trouble due to the armature or field coils burning out. This is possible because the current regulator definitely limits the generator's output to its safe carrying capacity. A separate current regulator allows the maximum output of the generator to be used when needed without in any way endangering the operation of the equipment.
- (b) The use of a separate current regulator unit in the Delco-Remy regulator serves to double the life of the contact points used. The operations of the regulator, over an extended period of six months or a year, will be about equally divided between the voltage regulator unit and the current regulator unit (Figure 7, page 20).

Since these two units never operate simultaneously, it is obvious that the wear on the contact points is divided between those of the current regulator and the voltage regulator. A further advantage of separate regulator units is that, should one set of contact points fail, the generator will not be injured, since the other unit will automatically hold the generator output to a safe value until repairs can be made.

- (c) The contact points used in the Delco-Remy regulator are made of a very expensive alloy, developed especially for the regulator, and are the best that can be obtained for this service. These points are the real "heart" of the regulator, and long, trouble-free contact life is of prime importance in the design of regulator units.
- (d) The Delco-Remy current and voltage regulator is mounted in rubber and designed to be attached to the engine dash under the hood. This isolates the regulator entirely from engine vibration, which is sufficient to seriously interfere with the proper operation of any regulator mounted directly on the generator.

See Part III in the January Issue.

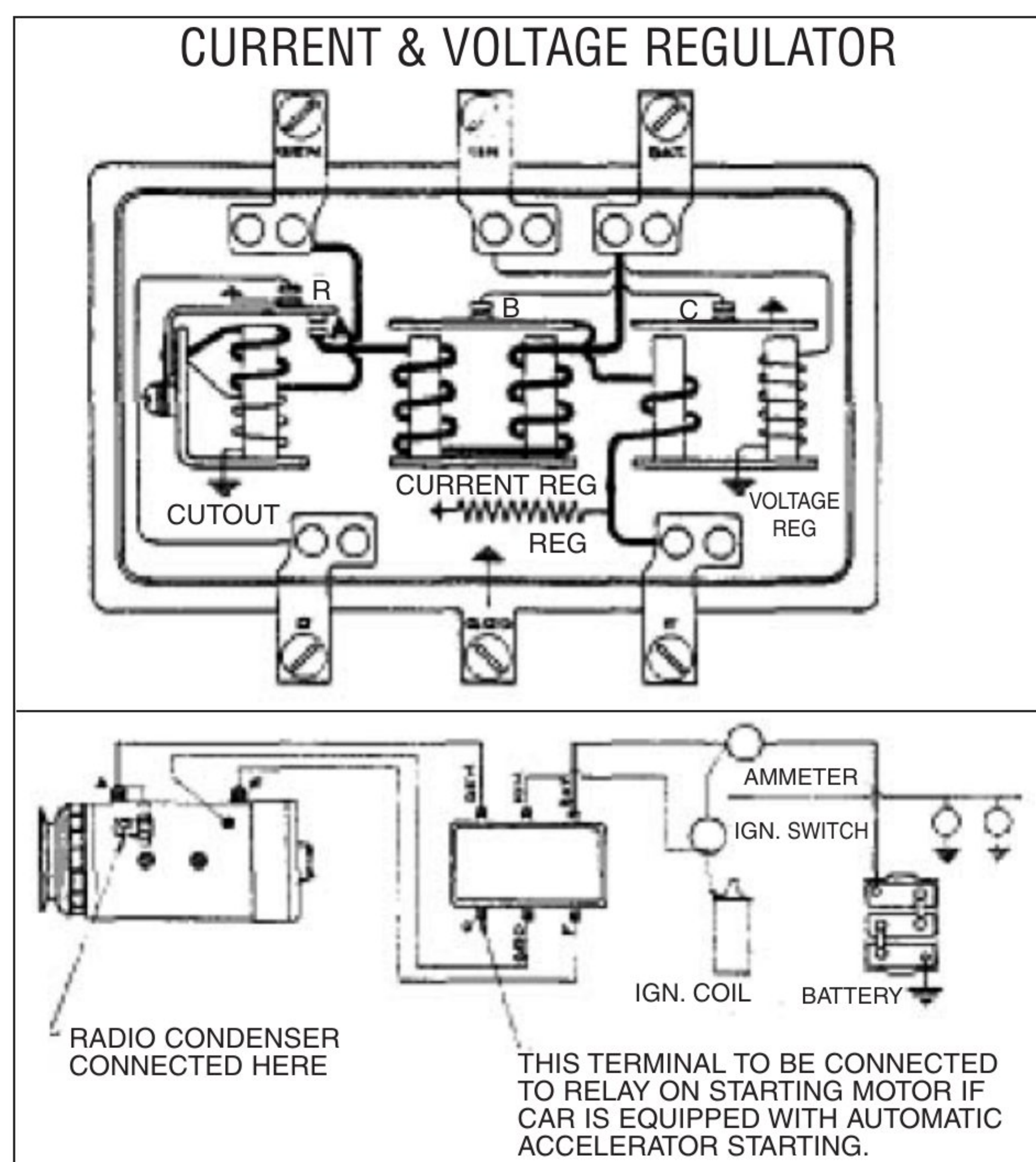


Figure 7—Diagram: Current and voltage regulator circuits and wiring