

Delco-Remy

Single-Unit **REGULATORS**

(Double Contact Voltage Regulator Type)

Used with Delcotron® Generators)

(10-RD SERIES, 100 TYPE)

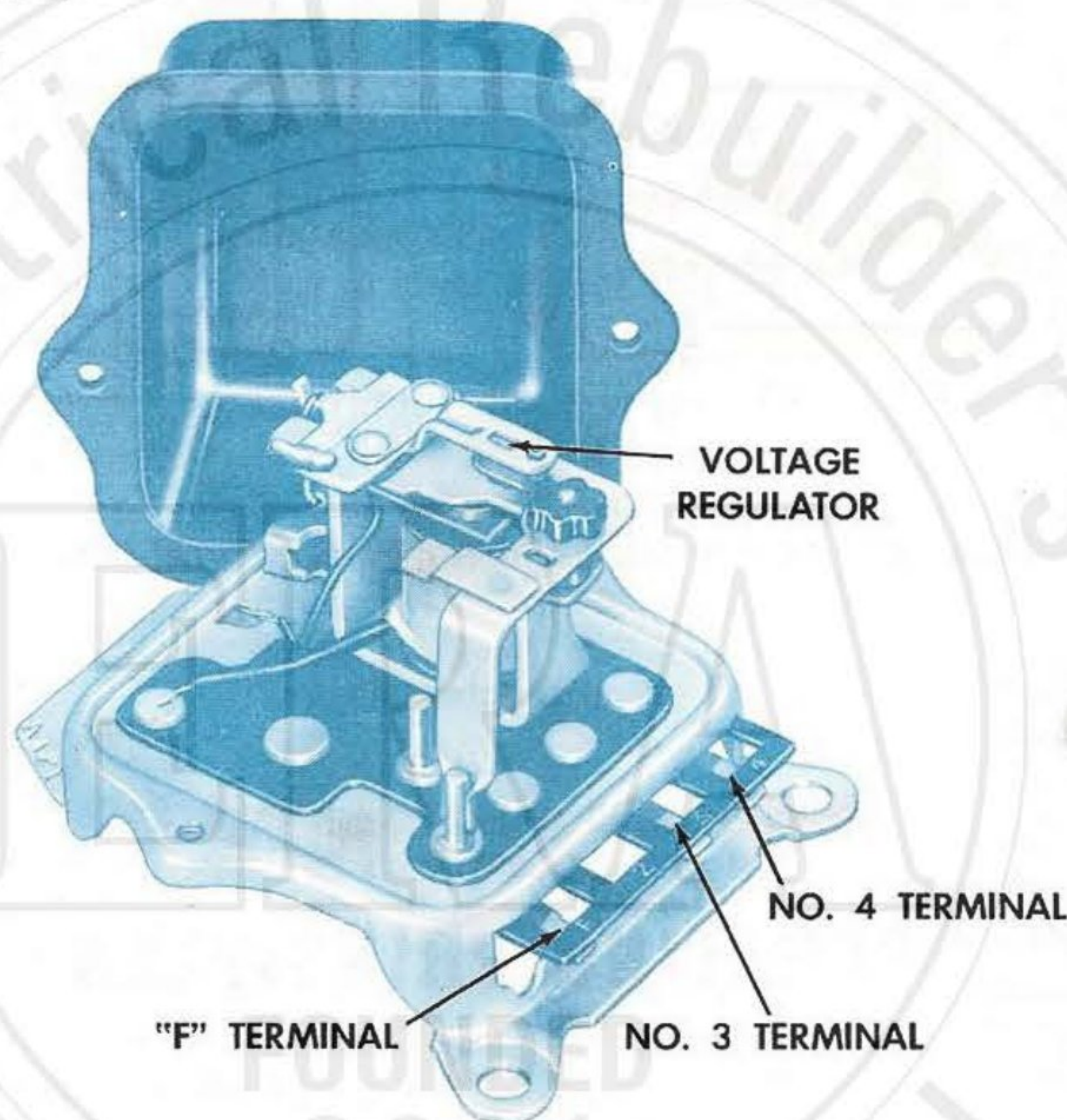


Figure 1—Typical single-unit regulator.

This bulletin is divided into three sections:

- Introduction—Page 1
- Operating Principles—Page 2
- Troubleshooting Procedures—Pages 3-5

INTRODUCTION

The regulators covered in this bulletin feature a double contact voltage regulator unit and terminals of the slip-connection type. The wiring harness connector is easily detached from the regulator by lifting the latch which clears a projection on the harness connector.

To avoid damage to the electrical equipment, always observe the following precautions.

- Do not polarize the generator.
- Do not short across or ground any of the terminals in the charging circuit except as specifically instructed herein.
- Never operate the generator with the output terminal open-circuited and the field circuit energized.
- Make sure the generator, regulator and battery have the same ground polarity.
- When connecting a charger or a booster battery to the vehicle battery, connect negative to negative and positive to positive.

Delco Remy

DIVISION OF GENERAL MOTORS CORPORATION, ANDERSON, INDIANA



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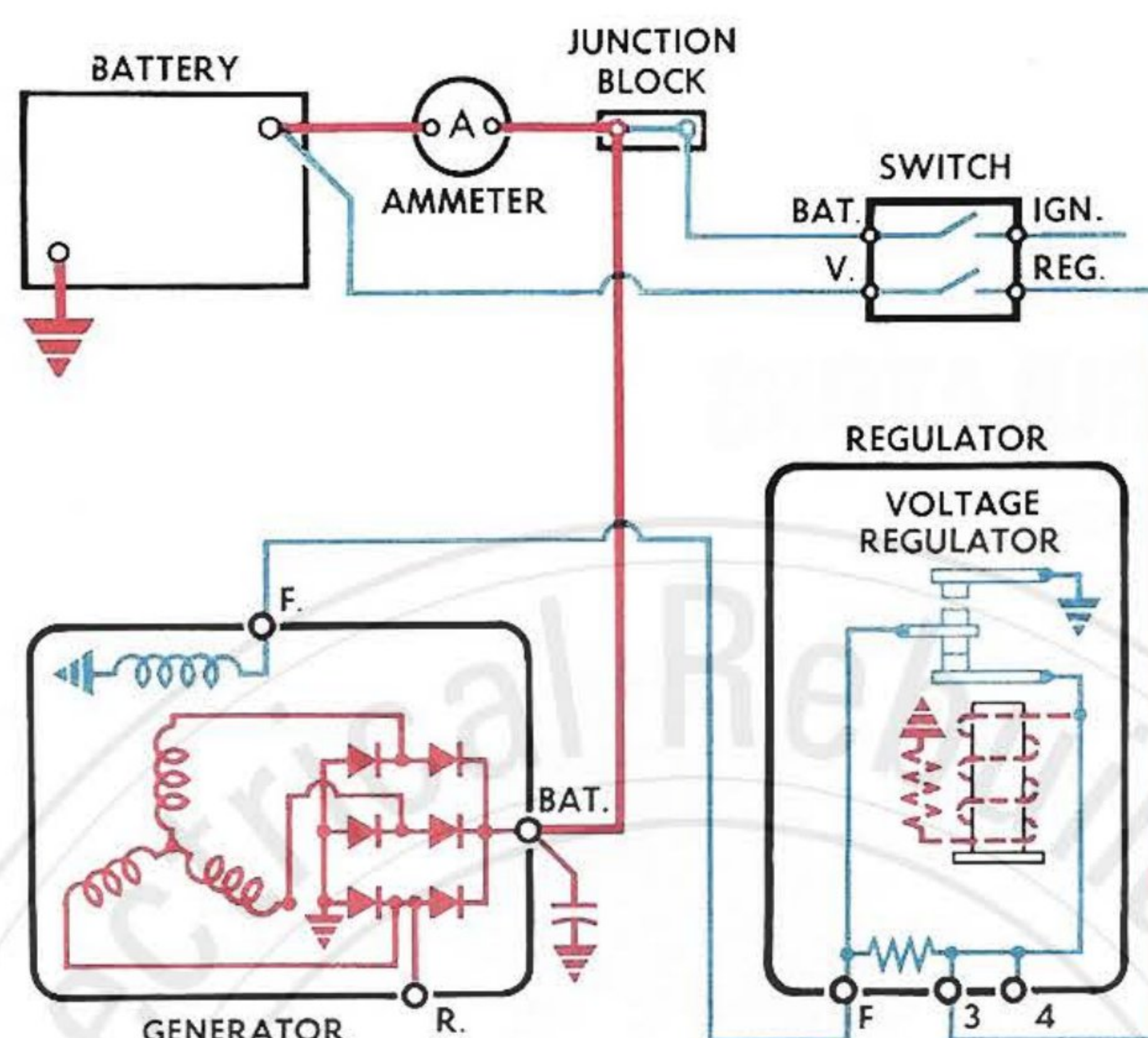


Figure 2—Typical wiring diagram showing internal circuits.

OPERATING PRINCIPLES

A typical wiring diagram showing internal circuits of the regulator is illustrated in Figure 2.

Following is a brief description of the operating principles of the units in this type of circuit. When the switch is closed, the generator field winding is connected directly to the battery. This allows field current to flow from the battery to the regulator No. 3 terminal, through the voltage regulator lower or series contacts to the regulator "F" terminal, and then through the generator field winding to ground.

When the generator begins to operate, a.c. voltages are generated in the stator windings, and these voltages are then changed or rectified to a d.c. voltage which appears at the "BAT" or output terminal on the generator.

As the speed of the generator increases, the voltage at the "BAT" terminal of the generator also increases. This impresses a higher voltage across the voltage regulator shunt winding. The increased magnetism created by the higher voltage across the winding causes the lower contacts to separate, and field current then flows through a resistor resulting in reduced field current. This reduced field current causes the generator voltage to decrease, which decreases the magnetic pull of the voltage regulator shunt winding. The spring causes the contacts to reclose, and the cycle then repeats many times per second to limit the generator voltage to a pre-set value.

As the generator speed increases even further, the resistor connected across the contacts is not of sufficiently high value

to maintain voltage control on the series contacts. Therefore the voltage increases slightly causing the upper or shorting contacts to close. When this happens, the generator field winding is shorted and no current passes through the winding. With no current in the field winding, the generator voltage decreases, which also decreases the magnetism in the shunt winding and the upper or shorting contact points open. With these points open, field current flows through the resistor and the field winding. As the voltage increases, the contacts re-close. This cycle then repeats many times per second to limit the voltage to a pre-set value at high generator speeds. The voltage regulator unit thus operates to limit the value of voltage throughout the generator speed range. Consequently the electrical accessories are protected from high voltage.

TROUBLESHOOTING PROCEDURES

(Close adherence to the following procedures in the order presented will lead to the location and correction of charging system defects in the shortest possible time. Only a portion of these procedures need be performed. It will never be necessary to perform all the procedures in order to locate the trouble.)

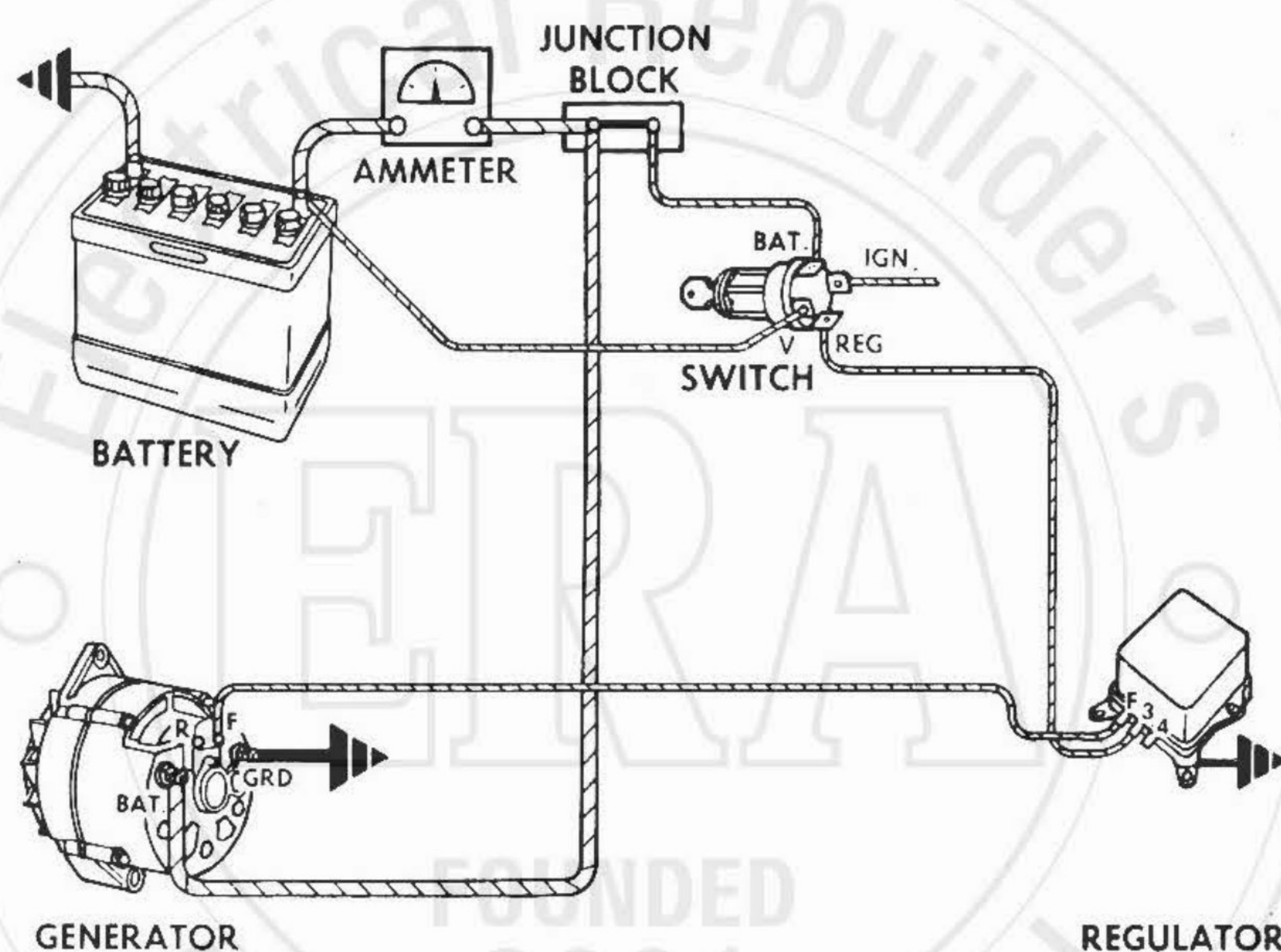


Figure 3—Typical wiring diagram showing basic lead connections.

A typical wiring diagram showing basic lead connections is shown in Figure 3.

Trouble will usually show up as an under-charged battery as evidenced by slow

cranking, or an overcharged battery as evidenced by excessive water usage.

A. UNDERCHARGED BATTERY

This condition can be caused by one or more of the following conditions.

1. **Loose Generator Drive Belt:** The generator drive belt should be tightened in accordance with engine or vehicle manufacturer's recommendations.

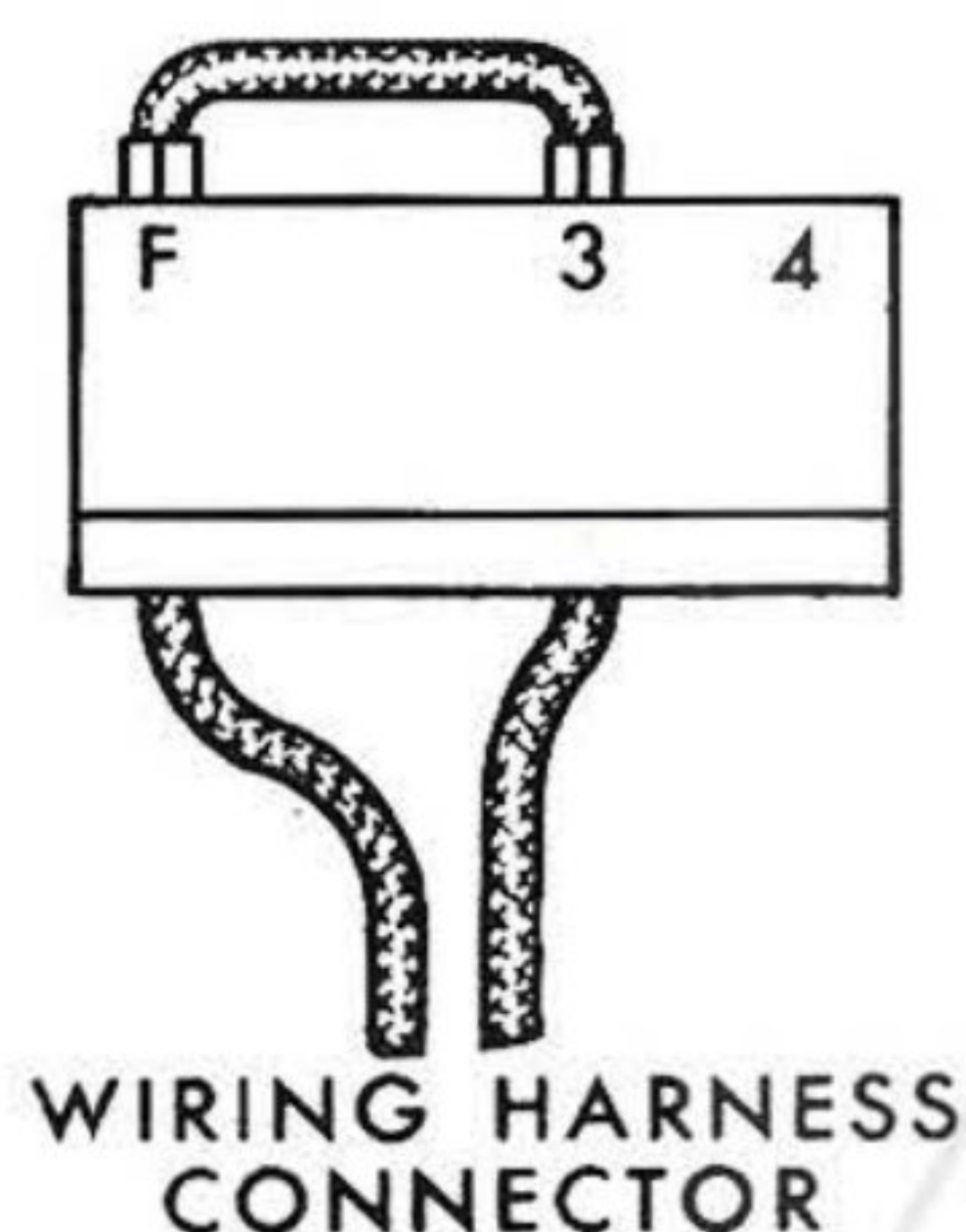
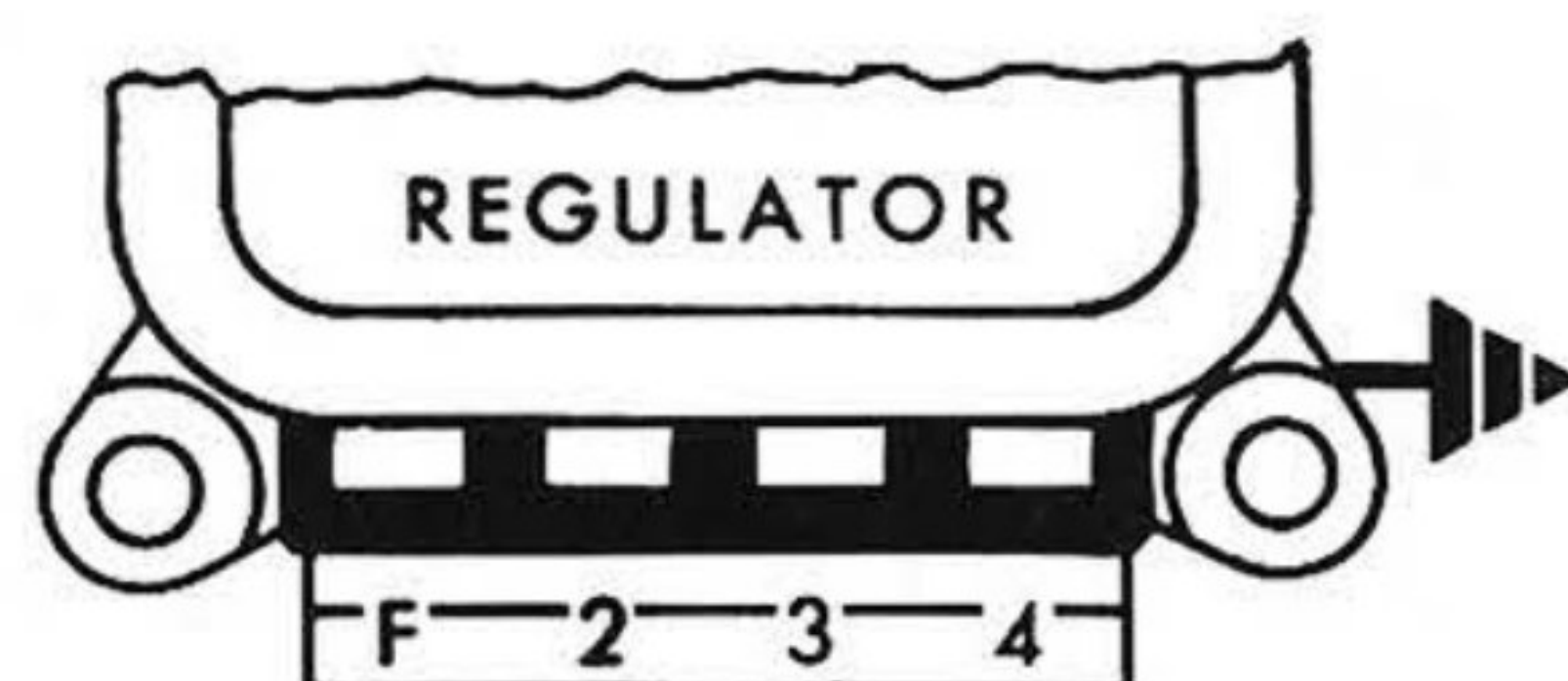
2. **Defective Battery:** If a defective battery is suspected, check per Delco-Remy Service Bulletin 1B-115 or 1B-116.

3. **Poor Circuit Connections:** Visually inspect all connections to make sure they are clean and tight, including the slip-

on connectors at the generator, regulator, and through the firewall. Check the wiring harness for grounds. Insure that the regulator is properly grounded. Clean the battery posts and cable clamps. Also, make the following tests with switch on.

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WIRING HARNESS CONNECTOR

Figure 4—Connection to harness connector.

- a. Connect voltmeter from generator "F" terminal to ground. Slide prod into harness connector to make connections.
- b. If voltage reading is obtained, proceed to Step 4.
- c. If reading is zero, connect voltmeter from regulator "F" terminal to ground.
- d. If reading is obtained, "F" terminal lead is open.
- e. If reading is zero, connect voltmeter from regulator No. 3 terminal to ground.
- f. If reading is obtained, replace regulator or adjust regulator voltage setting.
- g. If reading is zero, circuit is open between regulator No. 3 terminal and Ignition Switch.
4. **Defective Generator:** To determine if the generator is operating properly, proceed as follows:
 - a. Disconnect battery ground strap.
 - b. Connect an ammeter in the circuit at the "BAT" terminal of the generator and a voltmeter from the "BAT" terminal to ground.
 - c. Connect a jumper lead to the harness connector as shown in Figure 4.
 - d. Reconnect battery ground strap.
- e. Turn lights on high beam and blower motor on high speed.
- f. Operate engine at 1500-2500 r.p.m. as required to obtain maximum current output. **CAUTION:** If voltage exceeds 16 volts, connect a carbon pile across battery to keep voltage below 16 volts.
- g. If ampere output is within 10 amperes of rated output as stamped on generator frame, generator is good. Otherwise repair generator per the applicable generator service bulletin.
- h. An **alternate** method of checking generator output is to make connections as outlined above, operate at specified speed, and compare output with data in Delco-Remy Specification Bulletins 1G-186 or 1G-187. Output may vary slightly depending on generator temperature.
- i. Turn lights and blower off. Remove jumper lead from harness connector.
5. **Low Voltage Regulator Setting:** If no circuit defects are found, yet the battery remains undercharged, proceed to section entitled "Adjusting The Voltage Setting."

B. OVERCHARGED BATTERY

An overcharged battery, as evidenced by excessive water usage, can be caused by:

1. **Defective Battery:** If a defective battery is suspected, check per Delco-Remy Service Bulletin 1B-115 or 1B-116.
2. **Poor Circuit Connections:** Visually inspect all connections to make sure they are clean and tight, particularly the circuit between the battery, ignition switch and regulator No. 3 terminal, and the regulator ground.
3. **High Voltage Regulator Setting:** If no circuit defects are found, yet the battery remains overcharged, proceed to section entitled "Adjusting The Voltage Setting."

ADJUSTING THE VOLTAGE SETTING

It is important to remember that the voltage setting for one type of operating condition may not be satisfactory for a different type of operating condition. The proper setting is attained when the battery remains fully charged with a minimum use of water.

The voltage at which the regulator operates varies with changes in regulator ambient temperatures. The ambient temperature is the temperature of the air measured $\frac{1}{4}$ of an inch from the regulator cover. When checking and adjusting the voltage setting, always refer to

Delco-Remy Service Bulletin 1R-186 or 1R-187 for specifications.

To check and adjust the voltage setting, proceed as follows:

1. Insert a test prod into regulator No. 3 terminal, and connect a voltmeter from test prod to ground.

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2. Disconnect cable at battery negative post and insert $\frac{1}{4}$ ohm 25 watt resistor in series. NOTE: If battery is sufficiently charged to limit generator output to 10 amperes or less when adjusting voltage setting, $\frac{1}{4}$ ohm resistor need not be used.

3. Short across resistor with jumper cable, start engine, remove jumper cable. Do not operate with battery disconnected.

4. With all accessories turned off and harness connected to regulator, operate engine at idle speed for 15 minutes to establish regulator operating temperature.

5. Cycle regulator by detaching then reconnecting the harness connector at the regulator.

6. Bring engine speed up to 2000-2200 r.p.m., note ambient temperature and voltage setting. Compare with specifications.

7. To adjust voltage setting:

- a. Detach regulator harness connector, remove cover, reconnect harness connector.

- b. Turn **adjusting screw** as shown in Figure 5.

- c. For undercharged battery raise setting to upper part of specification range.

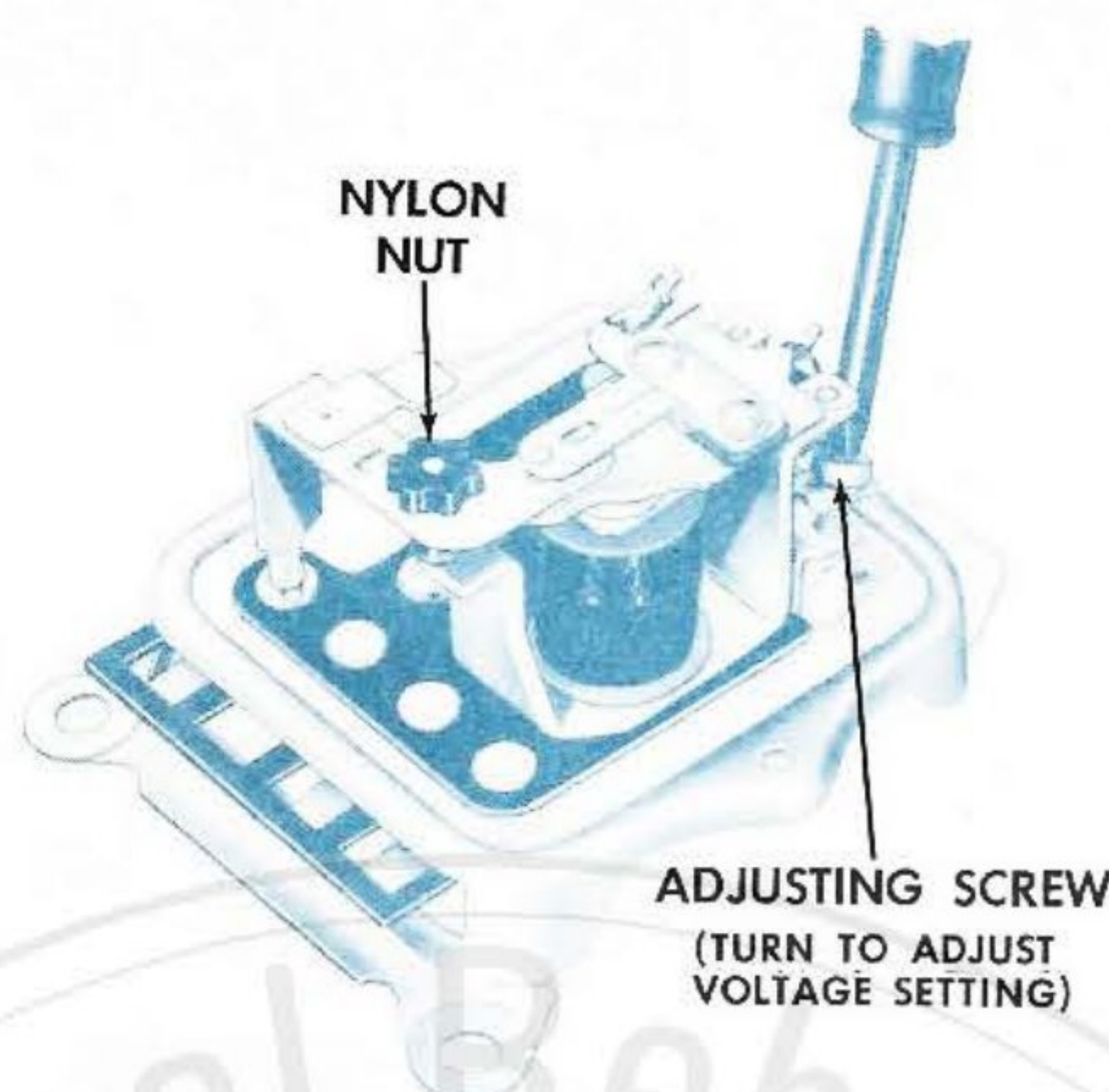


Figure 5—Adjusting voltage setting.

- d. For overcharged battery lower setting to lower part of specification range.

- e. CAUTION: Insure that springholder is against head of screw. When turning adjusting screw counterclockwise, turn until screw head is about $\frac{1}{8}$ " above holder, then pry holder up against screw head, then turn **clockwise** to make **final** setting.

8. After making setting, cycle by disconnecting then reconnecting harness connector at regulator.

9. Then operate at 2000-2200 engine r.p.m. and note setting. Re-adjust if necessary. Always cycle (step 8) before reading final voltage setting.

10. This procedure has adjusted the setting while operating on the upper or shorting contacts. Now proceed to adjust the setting on the lower or series contacts as follows.

11. Slowly **decrease** engine speed from the 2000-2200 r.p.m. value and observe voltmeter. When operation changes from upper to lower contacts, voltmeter reading should suddenly decrease a few tenths of a volt. (See Specifications.) Compare difference in voltage readings with specifications.

12. To decrease the difference in voltage between upper and lower contact operation, turn the nylon nut (Fig. 5) clockwise a slight amount. To increase the difference turn nylon nut counterclockwise. If this adjustment is made, the voltage setting must be re-checked as covered in Steps 5 through 11.

13. If voltage operation is erratic, and if the regulator cannot be adjusted to a steady value, replace the regulator. Do not attempt to clean the contact points.

14. **IMPORTANT:** Always remove harness connector at regulator when removing or replacing cover to avoid accidental grounds and consequent damage to regulator.