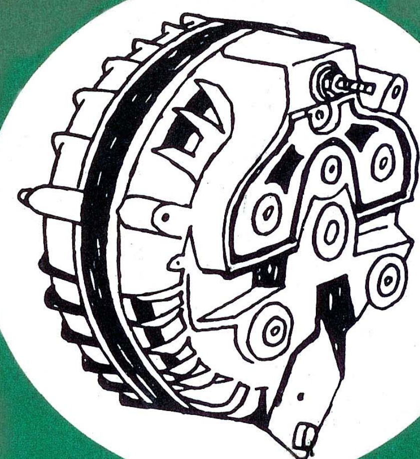
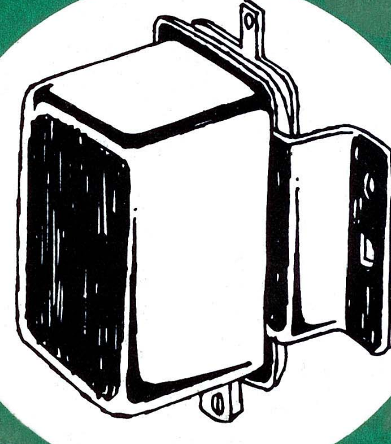
MASTER TECHNICIANS SERVICE CONFERENCE 66-11

REFERENCE BOOK



ALTERNATORS AND REGULATORS



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There are several ways to tackle charging system troubleshooting. One is to tighten every connection you can see and hope the trouble will go away. This doesn't take much time and it works . . . sometimes. Another approach is to substitute new parts for old parts. For instance, the regulator is easy to get at and it doesn't take long to install a new one and hope that it will correct the trouble. Judging from the number of *good regulators* that are sent to the scrap heap, arbitrary replacement of parts is a popular substitute for diagnosis.

A much better way to diagnose charging system troubles is to test the battery, the alternator, the regulator and the circuits connecting these units. You can do this by following the step-by-step instructions that came with your test instruments. If you are careful and take your time you can check out a charging system without really understanding what you are doing. There certainly is nothing wrong with this "follow-the-instructions" approach to diagnosis but there is an even better way.

The *better way* is to follow a logical test procedure and *understand* what each test tells you about the circuit or component being tested. This approach to diagnosis separates the Master Technicians from the parts changers and the step-by-steppers. The information in this reference book is just the ticket for giving you a good, practical working knowledge of alternators, regulators and the diagnosis of the entire charging system.

TABLE OF CONTENTS:

INTRODUCTION TO THE ALTERNATOR

STATORS, ROTORS, RECTIFIERS AND REGULATORS

There are two terminals, plus a ground, on the alternator and two terminals, plus a ground connection on the regulator. The instructions that come with most charging system test instruments tell you how to connect test instruments to these terminals but they don't tell you what's inside the alternator and the regulator. An understanding of the *internal* circuitry of these two units, as well as an understanding of the external circuits which connect these units into the car's electrical system, will equip you to do a better job of diagnosing charging system troubles.

THE ROTOR PROVIDES THE ROTATING FIELD

The rotor is belt-driven by the car's engine. It provides the magnetic field needed to generate a voltage. This magnetic field is created by current flow through the rotor windings.

Slip rings and brushes are used to connect the rotor windings to an external source of electricity. One brush is insulated and is connected to the car's battery through the ignition switch. The other brush is grounded through the alternator end frame to complete the rotor field circuit.

The basic field circuit includes the rotor windings, the brushes, the voltage regulator, the battery and all of the connecting wires. We'll explain the complete field and regulator circuit after we cover the other basic parts of the alternator.

THE STATOR STANDS STILL

The stator contains the windings or conductors that are cut by the rotating rotor field. You will remember from Session 66-3 that a magnetic field induces a voltage in a conductor when it cuts across the conductor. In the same way, the alternator rotor induces a voltage in the stator windings. There is no direct electrical connection between the stator and the rotor. The stator windings are connected to the alternator output terminal, which in turn is connected to positive terminal of the car battery. The only connection between the rotor and the stator is through their common ground. This common ground completes the circuit to the negative battery post.

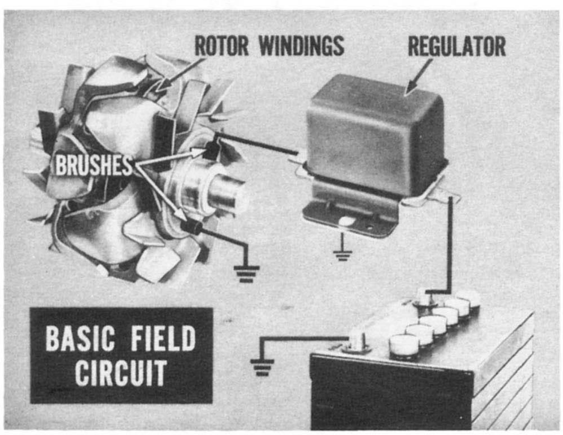


Fig. 1—The basic field circuit

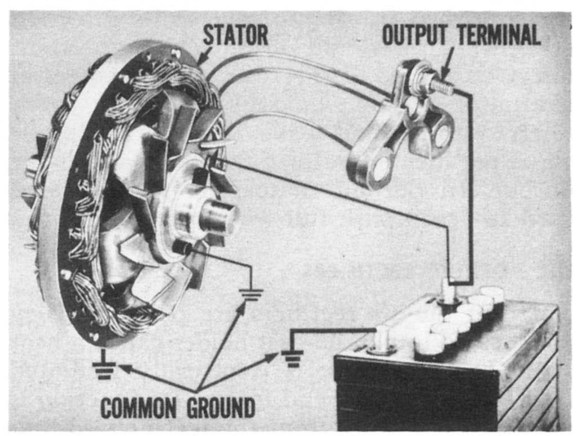


Fig. 2—The stator and rotor have a common ground

ALTERNATING CURRENT MUST BE RECTIFIED

The rotating rotor field generates an alternating voltage and causes an alternating current to flow through the stator windings. Of course, an alternating current can't be used to charge a battery. That's where the rectifiers get into the act . . . they change or *rectify* the alternating current produced in the stator windings into direct current.

A RECTIFIER IS A ONE-WAY FLOW VALVE

Basically, a rectifier is a one-way electrical flow valve. A rectifier allows current flow in one direction . . . prevents current flow in the other direction. A positive rectifier allows current flow from the lead wire to the rectifier base. A negative rectifier permits flow from the base to the lead wire.

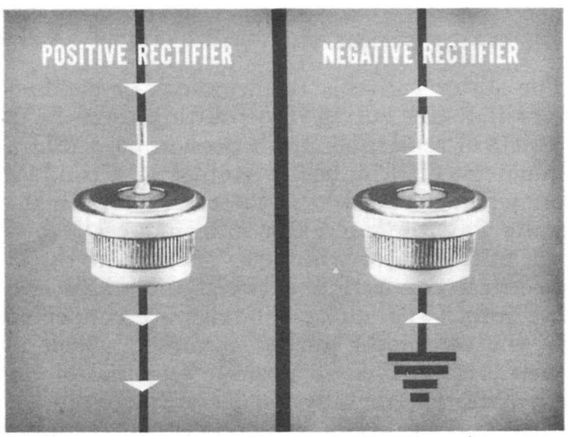


Fig. 3—A rectifier is a one-way electrical flow valve

A single rectifier could be used to interrupt current when it tries to reverse its direction of flow. This would result in intermittent direct current but only half of the potential alternator output would be used . . . this is referred to as half-wave rectification. Full-wave rectification utilizes the full alternator output. In our alternator, six rectifiers are used to accomplish full-wave rectification.

THE POSITIVE RECTIFIERS

Three of the six rectifiers are positive. They are pressed into a die-cast holder called a heat sink. The heat sink is electrically insulated from the alternator end frame. Its function is to carry heat away from the rectifiers so that they won't be damaged by high temperatures.

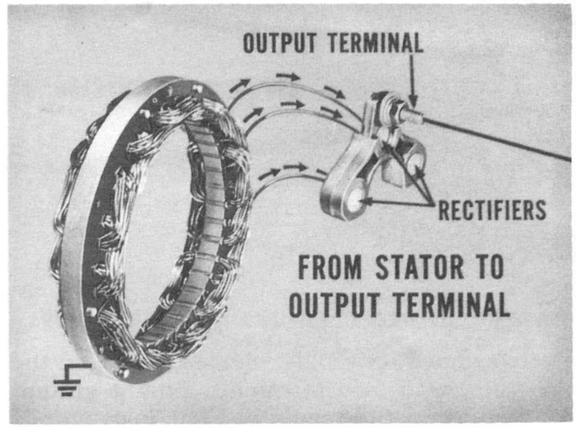


Fig. 4—Current flows from stator to output terminal

The positive rectifiers are connected electrically between the stator windings and the output terminal of the alternator. In other words, the rectifiers are connected so that current flow is always from the stator windings, through the rectifiers to the heat sink and from the heat sink to the alternator output terminal.

THE NEGATIVE RECTIFIERS

Three negative rectifiers are pressed into the alternator end frame. Electrically, the end frame is the negative terminal of the alternator. The lead ends of these rectifiers are connected to the stator windings. The negative rectifiers are connected so that current flow is from the end frame to the stator.

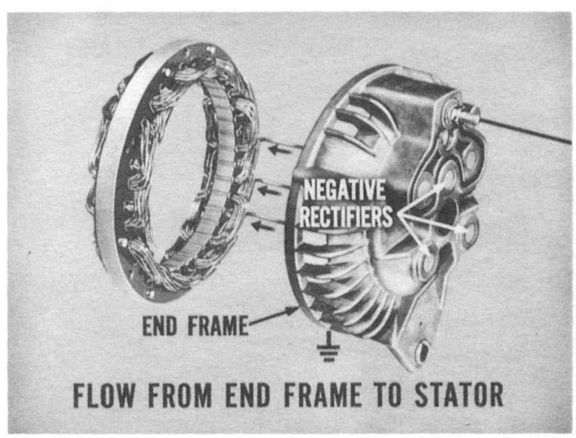


Fig. 5—Current flows from end frame to stator

Functionally, the positive rectifiers connected to the output terminal and the negative rectifiers connected into the ground side of the stator circuit, control the direction of current flow from the stator windings. As a result, fully rectified direct current is delivered to the output terminal.

THE CAPACITOR ABSORBS VOLTAGE SURGES

A capacitor is connected across the charging circuit from the alternator output terminal to ground. This capacitor absorbs voltage surges induced into the stator windings each time the direction of current flow through these windings reverses.

INTRODUCTION TO THE VOLTAGE REGULATOR

THE REGULATOR CONTROLS FIELD CURRENT

The regulator controls alternator output voltage by regulating current flow through the rotor windings. Line voltage is applied to the ignition terminal of the regulator. Controlled current is delivered to the rotor through the insulated brush and slip ring.

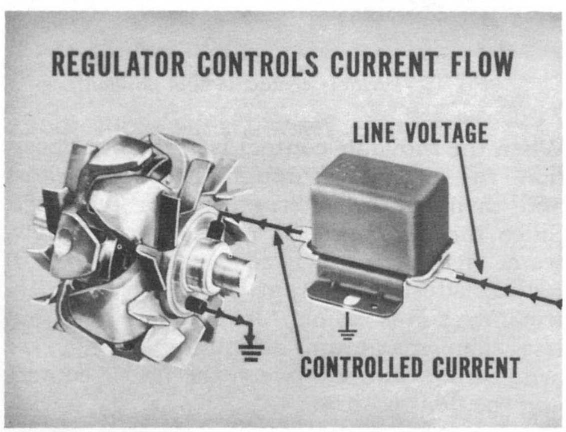


Fig. 6—The regulator controls alternator voltage

MEET THE WORKING PARTS

The regulator has fixed upper and lower contacts. A movable contact is attached to a spring-loaded armature. For all practical purposes the regulator is a vibrating switch which can route the field current through the upper contact circuit, through the lower contact circuit, or through a third circuit when the movable contact is mid-way between these two fixed contacts. We'll get into the internal regulator circuits as soon as we take a look at the underside of the regulator.

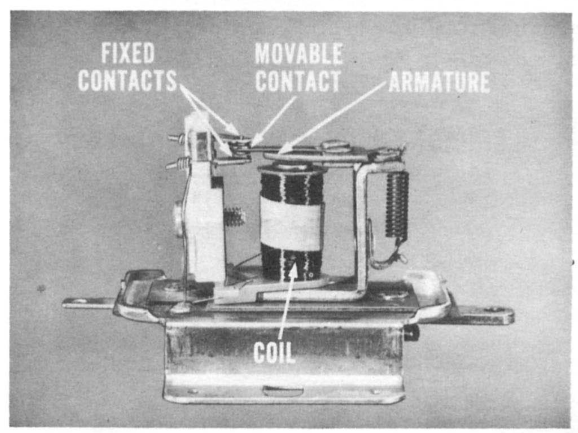


Fig. 7—The regulator is a vibrating switch

There are three resistors on the underside of the regulator. Two of these are used in the control circuit to reduce current flow to the alternator rotor. The primary purpose of the third one is to reduce arcing across the regulator points.

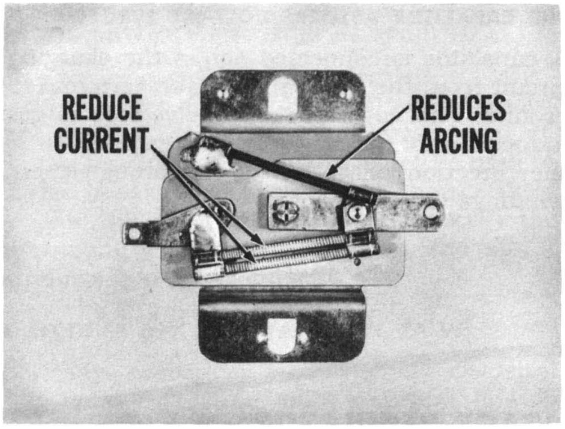


Fig. 8—The three regulator resistors

THE VOLTAGE COIL ATTRACTS THE ARMATURE

Line voltage is applied to the voltage coil when the ignition switch is turned on. Current flow through the voltage coil produces a magnetic field which tries to pull the armature downward. The amount of pull on the armature depends on the strength of the voltage coil field . . . which in turn depends on the amount of line voltage pushing current through the voltage coil. When line voltage is relatively low, the voltage coil field is not strong enough to pull the armature downward and break the circuit from the upper contact to the movable contact.

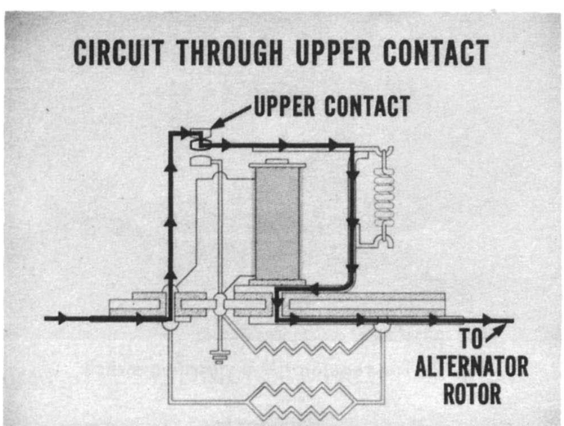


Fig. 9—Circuit resistance through upper contacts is low

THE UPPER CONTACT CIRCUIT

When line voltage is low, the circuit is through the upper contact and the regulator armature. Resistance in this circuit is low so maximum current flows to the alternator rotor windings. This produces a strong magnetic field in the alternator and provides maximum alternator output for any given engine speed.

THE "FLOAT" POSITION CIRCUIT

As soon as alternator output and line voltage increase, the magnetic field of the voltage coil gets stronger and pulls the movable contact away from the upper contact.

This is commonly referred to as the "float" position because the movable contact does not touch either of the fixed contacts.

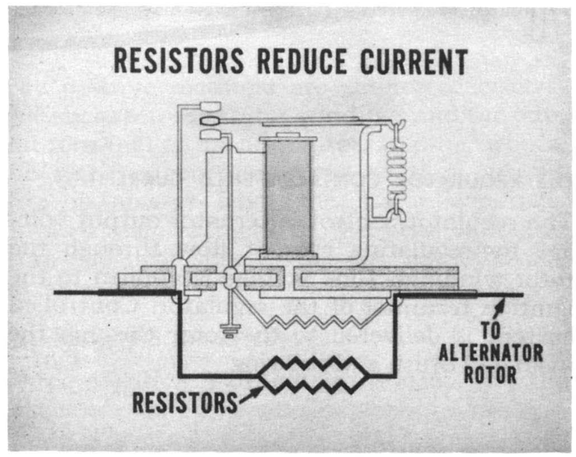


Fig. 10—Movable contact in float position

When the movable contact is in the float position, the circuit is through the two resistors and then to the alternator rotor windings. Since the two resistors reduce current flow, stator field strength is reduced. This in turn reduces alternator output. When the car's electrical system is calling for relatively high, but less than maximum alternator output, the armature vibrates between the upper contact and the float position.

THE LOWER CONTACT CIRCUIT

When electrical loads are light and engine speed is high, alternator output voltage tends to increase. An increase in voltage pushes more current through the voltage coil, creating a strong magnetic field. This strong field pulls the regulator armature down against the lower contact.

When the movable contact is pulled down against the lower contact, there is a direct circuit through the regulator armature and to ground through the lower fixed contact. As a result, the rotor field circuit is momentarily bypassed. Consequently, the alternator field starts to collapse and alternator output is momentarily interrupted. This interruption doesn't last very long. As a matter of fact, the armature and the movable contact vibrate between the "float" position and the lower contact. This regulating action controls field current and alternator output voltage when electrical demand is low and engine speed is relatively high.

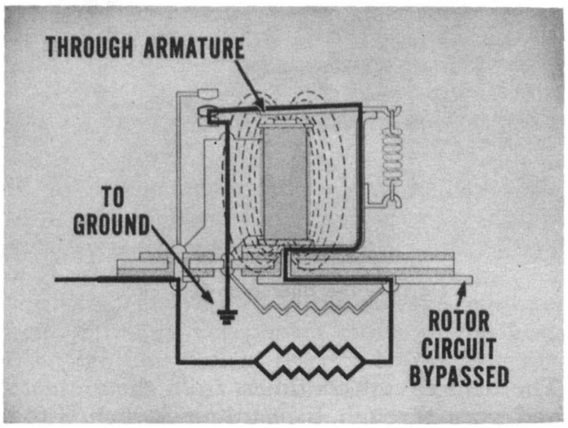


Fig. 11—Circuit through the lower fixed contact

ABOUT THOSE FUSIBLE WIRES

Two fusible wires are incorporated in the regulator to protect the regulator and the field circuit. One fusible wire completes the circuit between the upper contact and the input side of the two regulator resistors. In effect, this fusible wire provides a circuit which bypasses the two resistors and lets current flow through the low resistance of the regulator armature. If this upper contact fusible wire burns out, the circuit which provides high alternator field current is broken and the alternator will not deliver full output.

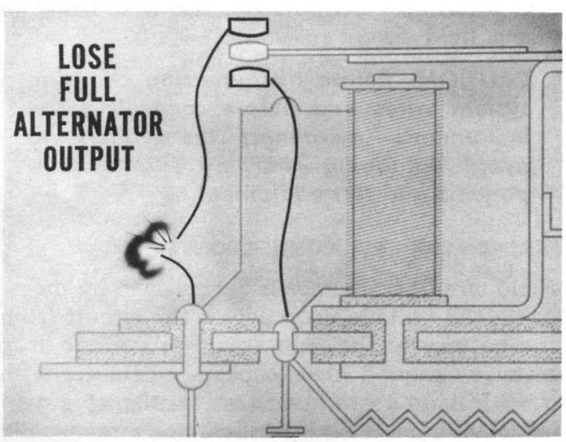


Fig. 12—Upper contact fuse wire blown out

The other fusible wire completes the circuit from the lower contacts to ground. If this lower contact fusible wire burns out, the ground circuit through the lower contact is lost. As a result, the regulator will not provide full voltage control under light electrical load and high-speed operating conditions.

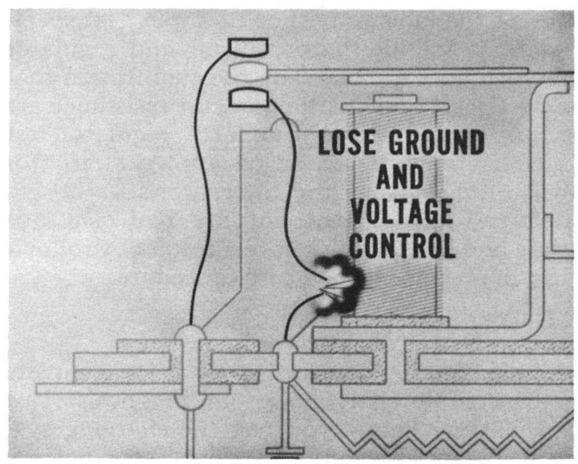


Fig. 13—Lower contact fuse blown out

INTERNAL AND EXTERNAL CIRCUITS

An understanding of how the alternator and the regulator work will help you understand charging system troubleshooting. It is equally important to understand both the internal and the external charging system circuits. So far we have concerned ourselves primarily with the internal circuitry of the alternator and the regulator. The next section of this reference book covers:

- The external field and output circuits.
- The testing of these external circuits.
- On-the-car alternator and regulator tests.

ON-THE-CAR TESTING AND TROUBLESHOOTING

The battery, the alternator, the regulator, the field circuit and the main charging circuit are the parts of the charging system. Each of these five charging system elements is a possible source of trouble and must be tested.

Charging-system diagnosis is not difficult but it is important to perform each of the separate tests in the recommended order. One of the easiest ways to get into trouble is to skip one of the circuit resistance tests and jump into one of the later tests. For example, test specifications for alternator output and regulator performance are based on the assumption that field circuit and charging circuit resistance are within specifications. Similarly, regulator test specifications are based on known alternator performance, and the alternator's ability to deliver rated current output. You can save time and be sure of your test results by following the recommended test procedure.

TEST THE BATTERY FIRST

A fully charged battery is a must for complete and accurate charging-system diagnosis. Test the battery before you test the charging system. If you have any questions about battery testing, it would be a good idea to review the reference book for session 66-4 which has some up-to-the-minute information on testing the new solid-top batteries. If the battery is not fully charged or not in good condition, install one that is, before making any of the following tests.

THE EXTERNAL FIELD CIRCUIT

The field circuit and the main charging circuit follow the same path from the battery to the ammeter. This common circuit goes from the battery, to the junction terminal of the starter relay, through the bulkhead connector, and through the ammeter. From here the two charging system circuits divide and follow different routes.

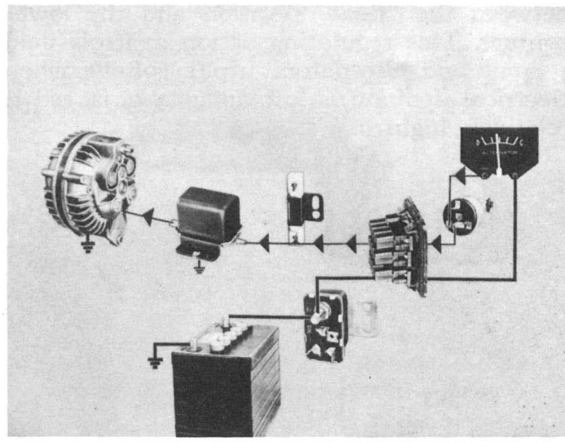


Fig. 14—The alternator field circuit

The field circuit continues from the ammeter and goes through the ignition switch. From there, it goes back through the bulkhead connector, connects to one of the ballast resistor terminals, goes through the regulator, to the alternator field terminal and through the rotor windings to ground. High resistance anywhere in the field circuit will affect voltage regulation and alternator output. So, the first thing to test is field circuit resistance.

CAUTION: ***Before disconnecting charging system wires and before connecting test instruments, disconnect the battery to avoid damaging charging system components and test equipment.***

FIELD CIRCUIT TEST CONNECTIONS

Field circuit resistance is determined by measuring the voltage drop across the circuit from the battery to the regulator. For voltage drop tests it's a good idea to use a voltmeter with a scale that's graduated in tenths of a volt since voltage drop specifications are usually given in tenths or even hundredths of a volt.

If the scale is divided into tenths, it is quite easy to read to the nearest five-hundredths of a volt.

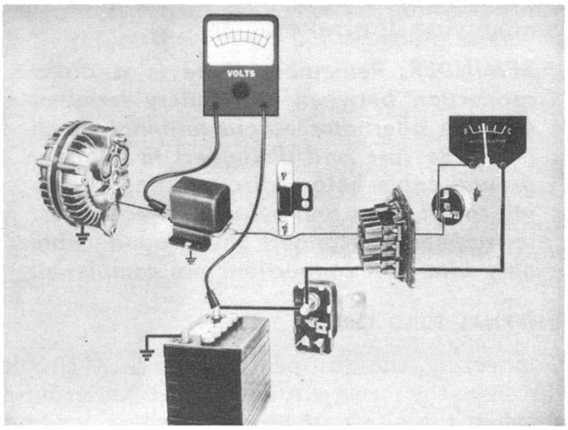


Fig. 15—Connections for field circuit voltage drop test

If your voltmeter has more than one scale, select the highest scale before you connect it across the circuit. Connect the positive lead of the voltmeter to the positive battery post and the negative lead to the voltage regulator field terminal. Disconnect either of the leads from ignition ballast resistor to prevent current flow through the ignition circuit. These test connections are shown in the accompanying illustration.

THE FIELD CIRCUIT TEST

Turn the ignition switch on. If your voltmeter has more than one scale, turn the selector to the lowest voltage scale.

Read the voltmeter. The voltage drop should not be more than fifty-five-hundredths (.55) of a volt . . . that's five-and-a-half tenths of a volt.

A voltage drop of more than .55 volt indicates high resistance in the field circuit between the battery and the regulator field terminal. This high resistance can cause the ammeter to fluctuate. It may also cause the regulator to over-control, resulting in a lower-than-normal charging rate.

To locate the cause of high resistance, move the negative voltmeter lead to each successive connection in the circuit leading back to the battery. When you come to a terminal in the circuit where there is a sharp decrease in voltage drop, you'll know that the high resistance is between that terminal and the previous point tested.

When trying to locate high resistance, it is helpful to wiggle the wires and connectors. Any voltmeter reaction to this wiggling indicates a questionable connection. Be sure field circuit resistance is within specifications before going on to the other charging system tests.

THE MAIN CHARGING CIRCUIT

The main charging circuit goes from the battery, to the starter relay junction terminal, through the bulkhead connector, through the ammeter, back through the bulkhead connector, and to the alternator output terminal.

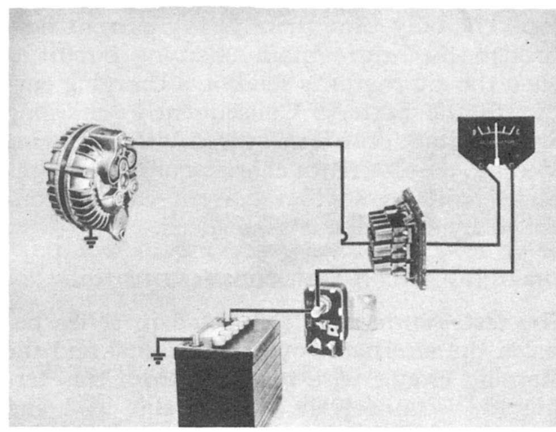


Fig. 16—The main charging circuit

A WORD ABOUT THE AMMETER

It is important that you, as well as owners, understand just how the car's ammeter fits into the charging circuit and what the ammeter actually shows. Owners who do not understand the function of the ammeter in the alternator circuit are apt to jump to the conclusion that something is wrong with the alternator if the ammeter doesn't register "CHARGE" at all times.

Please refer to Figure 15. Note that the ammeter is connected in series between the ignition switch and the battery. In that position, the ammeter shows which direction the current is flowing and how much current is flowing. The ammeter will register CHARGE only when alternator output is greater than the electrical load so that current not needed to operate the car's electrical units is being used to charge the battery. The ammeter will register DISCHARGE when alternator output is less than the electrical load so that part of the current needed by the car's electrical units is being supplied by the battery. In other words, the ammeter does not register alternator output . . . it registers current flow into or out of the battery.

WITH A FULLY CHARGED BATTERY, IT IS NORMAL FOR THE AMMETER TO REGISTER ZERO.

THAT ONE-WAY FLOW AGAIN

Current never flows from the battery to the alternator output terminal because the rectifiers won't permit current flow in that direction. The only time there is any current flow through the entire main charging circuit is when the alternator is sending a charging current to the battery. Consequently, charging circuit voltage drop is measured with the engine running, the alternator charging and field regulation removed so that current can be controlled by adjusting engine speed.

CHARGING CIRCUIT TEST CONNECTIONS

The test ammeter is connected in series between the alternator output terminal and the charging circuit wire removed from this terminal. Disconnect the field circuit lead and connect a jumper from the alternator output terminal to the alternator field terminal. The jumper provides a field circuit and removes all field regulation. The voltmeter is connected across the circuit from the charging circuit wire to the positive battery post. Check your test connections with those shown in the accompanying illustration.

***REMINDER:* Remember there is a direct connection between the battery terminal and the alternator output terminal at all times. Be sure and disconnect the battery ground cable before disconnecting charging circuit wires and before connecting test instruments. Reconnect the ground cable only after test connections are completed.**

INTERNAL FIELD CIRCUIT TEST

Connecting the jumper completes a circuit through the test ammeter and to ground through the alternator brushes, slip rings and rotor windings. As a result, the ammeter will automatically register current flow through the rotor before the ignition is turned on.

A field current of less than 2.4 amperes indicates high resistance inside the alternator. This is most apt to be caused by poor contact between the brushes and the slip rings. If the test ammeter registers more than 2.8 amperes, an internal short circuit is indicated. This could be in the insulated brush lead or in the rotor windings. In either case, the alternator should be removed for further testing.

CHARGING CIRCUIT RESISTANCE TESTS

If field current draw is within specifications, go ahead with the main charging circuit re-

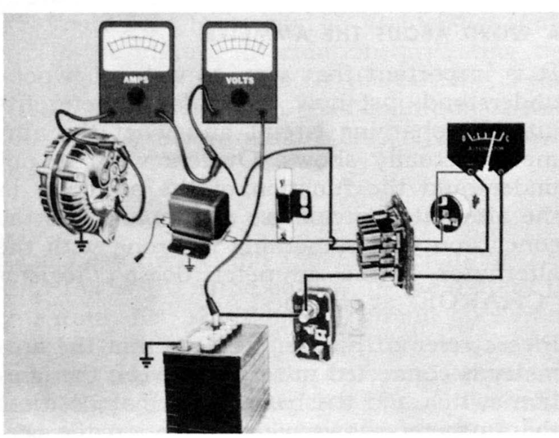


Fig. 17—Charging circuit resistance test connections

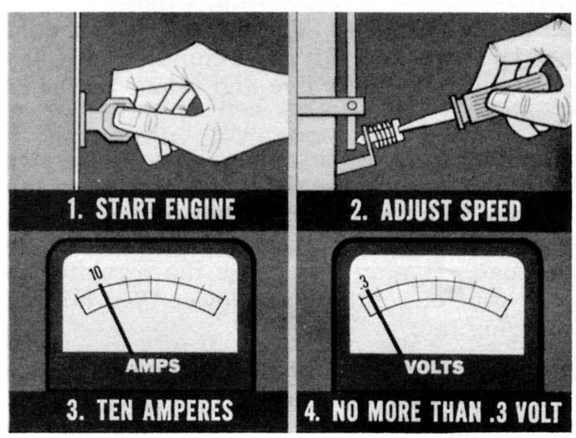


Fig. 18—Voltage drop measures charging circuit resistance

sistance test. To make this test, start the engine and adjust engine speed until you get a reading of 10 amperes on the test ammeter. The voltmeter should not register a drop of more than .3 volt. If the voltage drop is higher than this, clean and tighten all connections and retest the circuit before going on to the next test.

Don't forget to test for high resistance in the ground side of the main charging circuit. Don't disturb the ammeter or jumper connections. Simply move the voltmeter leads so that the voltmeter is connected across the ground side of the circuit from the alternator end frame to the negative battery post.

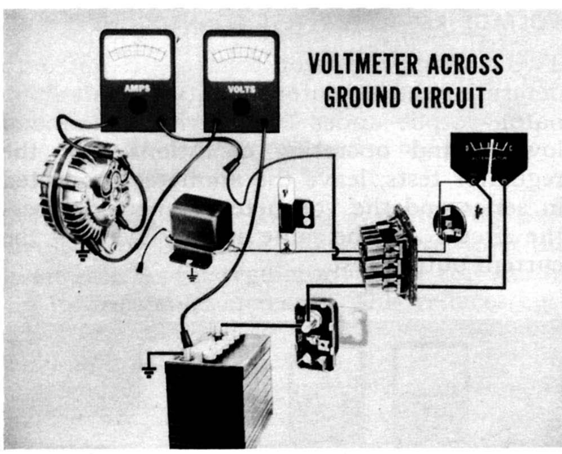


Fig. 19—Measure ground circuit voltage drop, too

With the engine running and ten amperes showing on the test ammeter, the voltage drop should be no more than .3 volt . . . the same as for the insulated side of the circuit.

CURRENT OUTPUT TEST CONNECTIONS

If field and charging circuit resistance are within specifications, you can go on to the alternator current output test. The current output test is made with all field regulation removed. This eliminates the regulator and tells you whether or not the alternator is capable of delivering specified current output at a specific test speed.

Both voltage and engine speed must be carefully controlled. So, connect a carbon pile across the battery so that you can adjust the load to get the voltage specified for this test. Connect a tachometer so that you can set engine speed accurately.

WARNING: ***Be sure the carbon pile is "Off" before you connect it across the battery or you'll get fireworks when you touch the leads to the battery posts!***

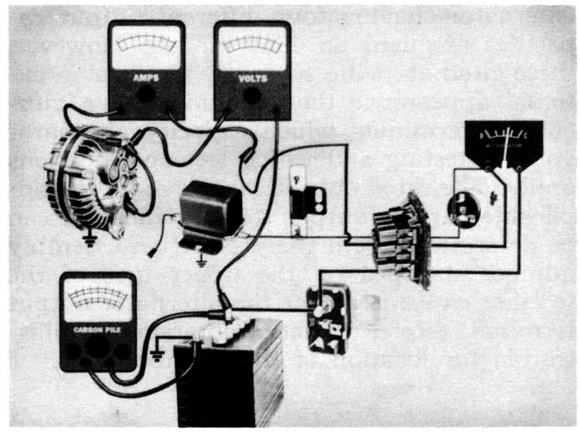


Fig. 20—Current output test connections

Leave the ammeter connected in series and the field jumper in place, as they were for the circuit resistance test. Move the voltmeter leads for this test. Connect the voltmeter across the circuit from the alternator output terminal to the negative battery post so that it will register output voltage instead of voltage drop.

THE CURRENT OUTPUT TEST

Alternator current output specifications are based on exact speed and voltage so adjust

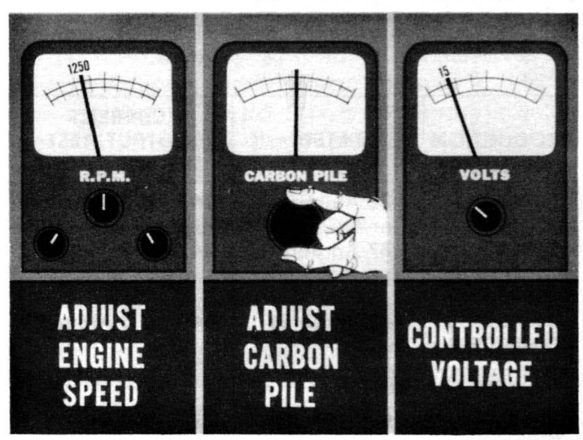


Fig. 21—Output measured at controlled speed and voltage

engine speed to 1250 r.p.m. Adjust the carbon pile so that the voltmeter registers 15 volts. Your test ammeter will now show current output under controlled speed and voltage conditions.

ALTERNATOR RATINGS AND IDENTIFICATION

Alternators having four different output capacities are used on 1966 models. However, these alternators are so nearly identical in external appearance that you may have difficulty determining which capacity alternator you are testing and which test specifications apply. The rated output capacity and the applicable current output test specification can be determined from the production assembly number stamped on the upper face of the rectifier end shield near the alternator output terminal. (Refer to the accompanying illustration for location of this number.)

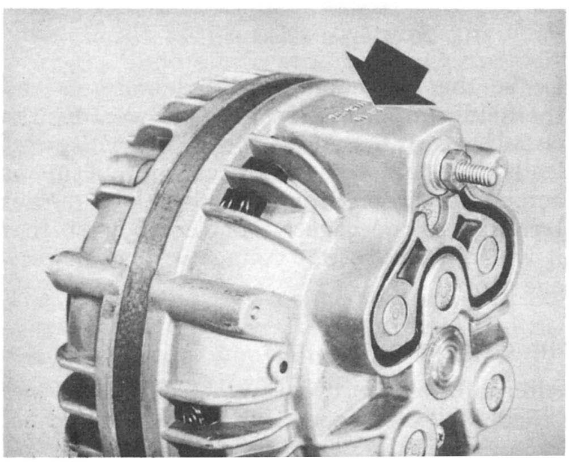


Fig. 22—Production assembly number identifies alternator

PRODUCTION NUMBERS	RATED OUTPUT	CURRENT OUTPUT TEST SPECIFICATIONS
2098835	30 Amperes	26 ± 3 Amperes
2098830	37 Amperes	34.5 ± 3 Amperes
2098850 2444599 3000005	46 Amperes	44 ± 3 Amperes
2642487 2642121 3000010	60 Amperes	51 ± 3 Amperes

The foregoing numbers are 1966 production alternator and pulley assembly numbers and should not be used when ordering replacement parts. Three different production numbers are used for both the 46- and the 60-ampere alternators to identify different alternator-pulley combinations. Refer to the 1966 Mopar Parts Catalogue for correct service part numbers.

The tolerance of plus or minus 3 amperes is provided to compensate for temperature variations. Also, the current output test specifications are test standards, not a test of maximum output. If the alternator fails to pass the output test it should be removed from the car and tested further to locate the trouble.

VOLTAGE REGULATOR TEST CONNECTIONS

Two voltage regulator tests are required to determine the regulator's ability to limit alternator output under both high-demand and low-demand operating conditions. For the regulator tests, leave the ammeter connected in series and the voltmeter connected across the circuit . . . the same as they were for the current output test.

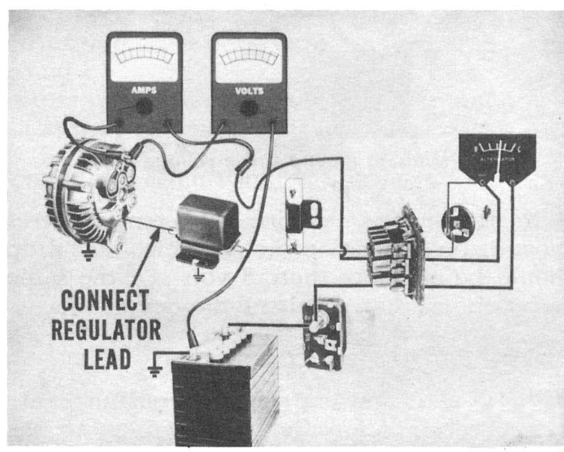


Fig. 23—Voltage regulator test connections

Remove the field jumper and reconnect the regulator lead to the alternator field terminal. This puts the regulator back into the field circuit. Check your test connections against those shown in the accompanying illustration.

TEMPERATURE-NORMALIZE THE CHARGING SYSTEM

Start the engine and adjust speed to 1250 r.p.m. Turn on lights or accessories until the test ammeter registers 15 amperes. Then, let the engine run with this 15-ampere load for 15 minutes to temperature-normalize the entire charging system.

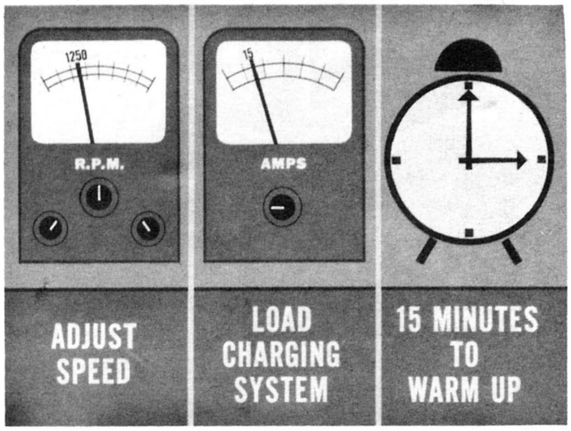


Fig. 24—Carefully adjust speed and load

All parts of the charging system, and particularly the regulator, do not warm up at the same rate. As the regulator voltage coil warms up its resistance increases. This reduces current flow and the strength of the magnetic field pulling downward on the regulator armature. As a result, regulated voltage increases as the regulator voltage coil warms up. But that's only part of the normalizing story.

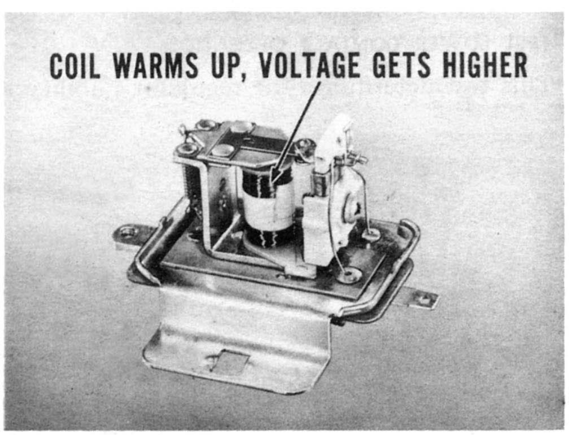


Fig. 25—Voltage tries to increase as the coil warms up

As the regulator armature warms up, it deflects more easily under the pull of the magnetic field. So, as the regulator armature warms up, regulated voltage tends to decrease. However, the voltage coil and the armature don't normalize at the same rate. As a result, voltage tends to fluctuate during the warmup or normalizing period.

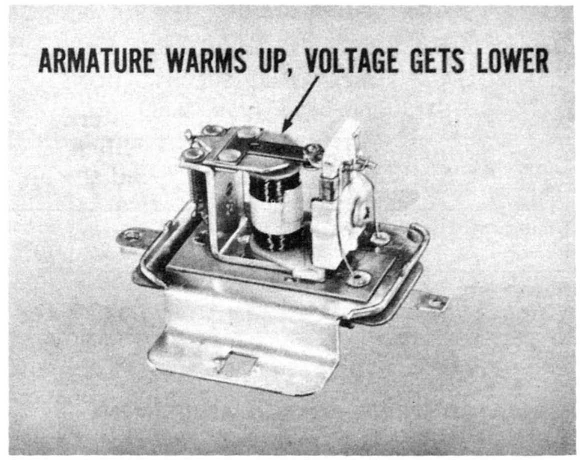


Fig. 26—Voltage tends to decrease as the armature warms up

TWO VOLTAGE REGULATOR TESTS

There are actually two voltage regulator tests. The first test checks voltage control when the movable contact is operating against the upper contact as it does under conditions of relatively high electrical load and low engine speed. The second test checks operation when the movable contact is operating against the lower contact as it does under conditions of light load and high engine speed.

CYCLE THE REGULATOR BEFORE YOU TEST

After the charging system is normalized but *before* you test the regulator, be sure and cycle the regulator. To do this, you simply disconnect or interrupt the regulator circuit for a split second. This interruption collapses the regulator coil field. The field is then re-established under fully normalized operating conditions to provide accurate test results.

TEST UPPER CONTACT OPERATION

After the charging system is temperature-normalized and cycled, it may be necessary to readjust engine speed and electrical load. Make sure engine speed is exactly 1250 r.p.m. and the test ammeter registers 15 amperes.

Voltage regulator specifications are based on specific temperature readings, so take the temperature of the air two inches from the regulator cover . . . regulator cover installed. Next, read the voltmeter and compare your voltage and temperature readings with the following specifications:

VOLTAGE-TEMPERATURE SPECIFICATIONS (15-amp. Load, 1250 r.p.m.)						
Temperature Degrees F.	47	70	93	117	140	163
Minimum Voltage	13.6	13.5	13.4	13.3	13.2	13.1
Maximum Voltage	14.6	14.5	14.4	14.3	14.2	14.1

REGULATOR SPRING TENSION ADJUSTMENT

If voltage is higher than the maximum specified, armature spring tension is probably too great. If voltage is lower than the specified minimum, spring tension is probably too low. The upper contact voltage setting is adjusted by bending the lower spring hanger *down* to *increase* voltage; *up* to *decrease* voltage.

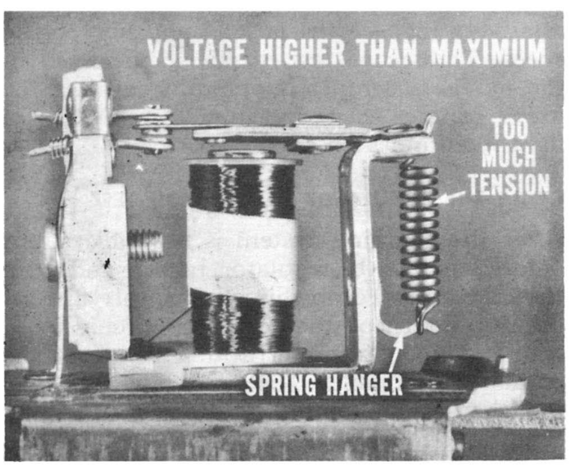


Fig. 27—Armature spring tension adjusts voltage

An insulated tool must be used to bend the spring hanger. The regulator must be installed on the car, cover in place, and retested after adjustment.

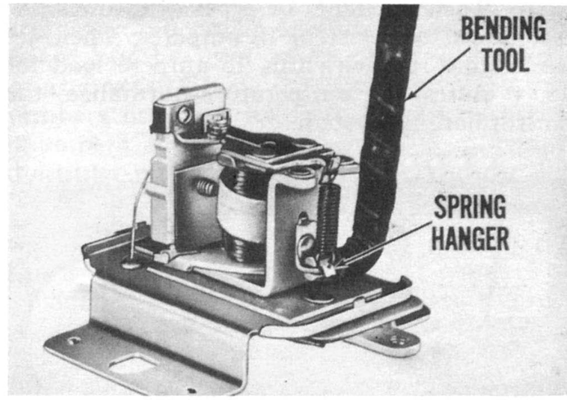


Fig. 28—Use insulated tool to bend lower spring hanger

It is permissible to adjust and retest the regulator without reinstalling it on the car. However, the following precautions must be observed:

- A ground jumper must be used to ground the regulator base.
- An insulated fender cover or other insulating device must be used to make sure regulator terminals, resistors, or other current-carrying parts are not accidentally shorted.
- The regulator must be reconnected into the circuit, cover installed and retested after each adjustment.
- The regulator must be held or positioned in the same attitude (same relative angle) as it is when properly installed on the vehicle.

TEST LOWER CONTACT OPERATION

This test determines the regulator's ability to

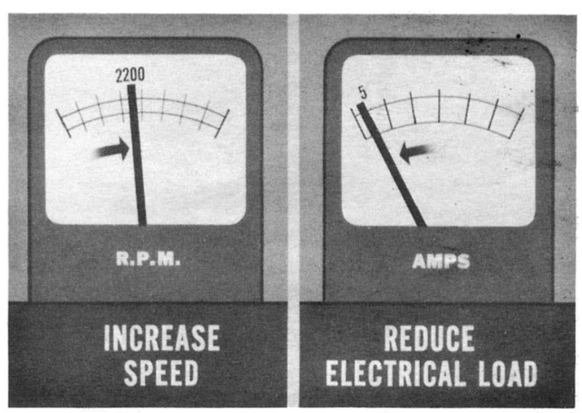


Fig. 29—Test voltage control at higher engine speed

control voltage at higher engine speeds when the electrical load is light. Increase engine speed to 2200 r.p.m. and reduce the electrical load by turning off all the lights and accessories used to obtain a 15-ampere load in the previous (upper contact) test. Amperage registered on the test ammeter should drop below 5 amperes.

Voltage should increase at least .2 volt but

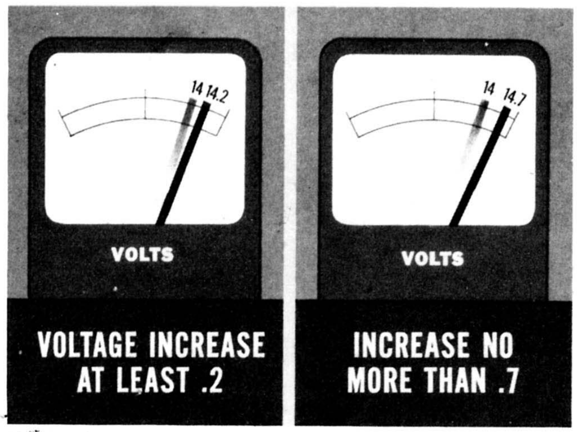


Fig. 30—Voltage increase tests high-speed voltage control

should not increase more than .7 volt. If voltage does not increase at least .2 volt, the armature air gap is probably too small. Conversely, if the voltage increase is more than .7 volt, the air gap is probably too great. This is easy to remember: Voltage increase too great, increase air gap; voltage increase too small, reduce air gap. The air gap adjustment is not a difficult

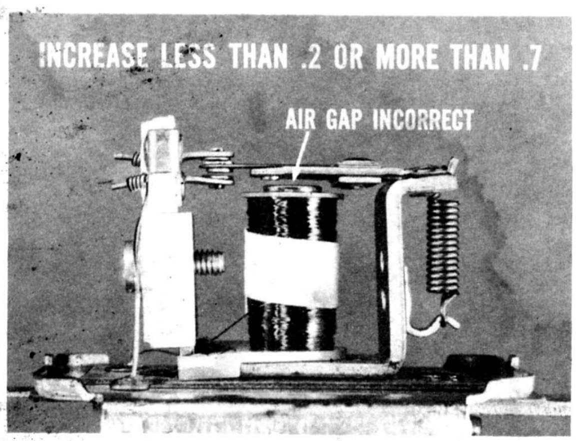


Fig. 31—Air gap adjustment affects voltage control

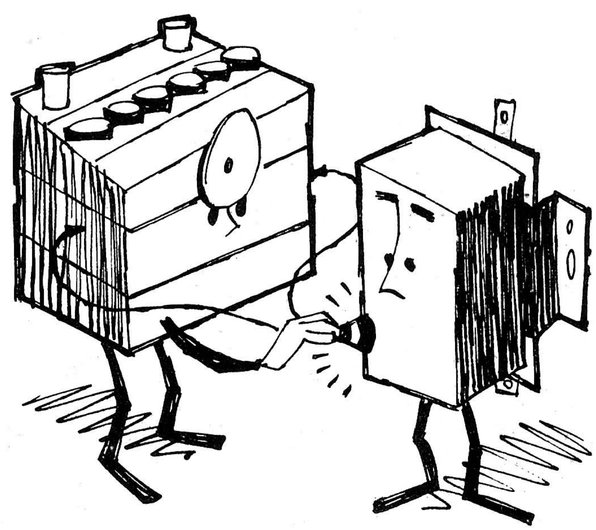
one. You'll find instructions for making this adjustment in your Service Manuals.

ADJUSTING VOLTAGE TO DRIVING CONDITIONS

The voltage regulator may be adjusted, within maximum and minimum specified limits, to accommodate driving habits, conditions and electrical load requirements. However, the regulator must not be arbitrarily adjusted in an attempt to compensate for battery or charging system troubles.

The voltage-temperature specifications provide a tolerance of one volt from the maximum to the minimum voltage specified for each temperature range shown on the chart. If there are no defects in the charging system or the battery, but the battery is consistently in a low state of charge, increase the voltage setting .3 volt. Have the customer return after a week or two and see if the battery state of charge has improved.

When the regulator is correctly adjusted to driving conditions, the battery should remain at a minimum specific gravity of 1.225 in winter or 1.245 specific gravity in summer. Also, when the voltage regulator is properly adjusted, the battery should not require more than one ounce of water per cell for each thousand miles of driving. If the battery uses more water than this, decrease the voltage setting .3 volt and recheck battery state of charge and water consumption again after several more weeks of driving.



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