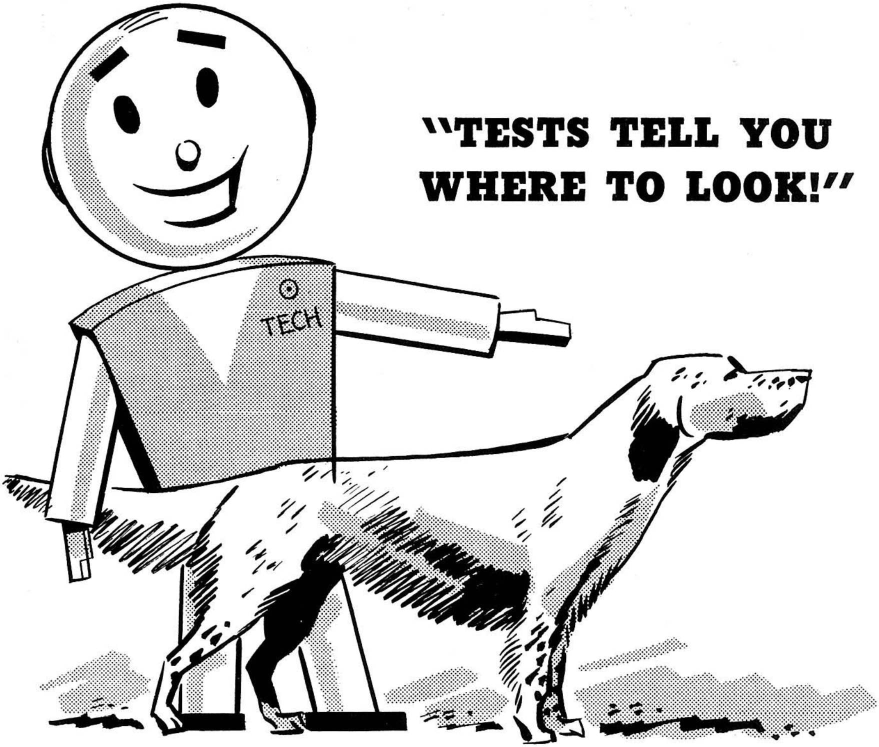
SERVICE REFERENCE BOOK
of the MASTER TECHNICIANS SERVICE CONFERENCE
session no. 127

ELECTRICAL TESTS

PREPARED BY CHRYSLER CORPORATION
Plymouth • Dodge • De Soto • Chrysler • Imperial

"TESTS TELL YOU WHERE TO LOOK!"



It's always easier to find what you're lookin' for when somebody tells you exactly where to look. And that's how helpful on-the-car tests can be when you're looking for the cause of an electrical condition. These tests save time and effort by pinpointing the source of trouble so you won't have to remove any unit unnecessarily.

Without tests, how long you take to find the cause of a condition can be anybody's guess. But the smart technician doesn't guess-and-by-gosh any more. He uses instruments and makes sure. And that's what this reference book is all about.

You'll find information here regarding which on-the-car tests to use, how and when to use them, and some corrections that may be needed. All of these useful tips are arranged as follows:

FIRST—CLASSIFY THE CONDITION

Analyzing the condition as reported, or as it shows up during preliminary inspection, often gives you a good clue regarding which test to make first. Here are some examples:

1. Hard starting plus *slow* engine cranking speed tells you to begin by checking the battery and the starting circuit. If lights go out or dim excessively while cranking, there's a good chance that high resistance at the battery connections might be the cause.

2. Hard starting but *good* cranking speed points to something out of order in the ignition system or carburetion. By making a few quick tests, you'll know whether or not the trouble *is* ignition. Additional tests will tell you *where* in the ignition system the trouble is located.

3. A battery continuously *undercharged* means there's trouble in the generator, regulator, battery or circuit.

4. When a battery uses too much water, look for charging system faults, usually a high charging rate.

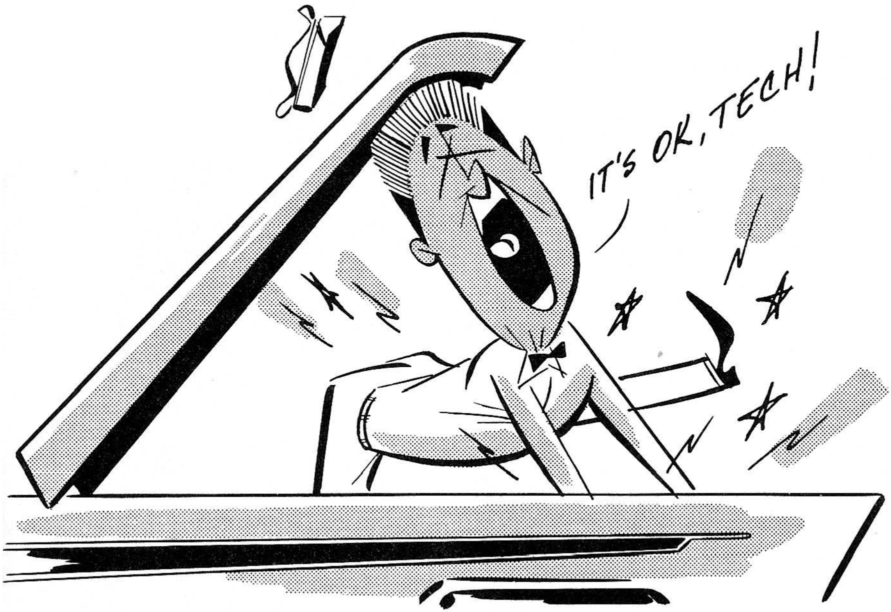
5. Frequent burning out of lights, radio parts, ignition point burning, or other damage to electrical units generally means the voltage regulator setting is too high. Or, it might mean that the generator field circuit is grounded out which doesn't permit the regulator to control voltage. As a quick check . . . if lights flare up when engine speed is increased, voltage setting may be too high.

That gives you some idea of how a reported condition can be classified. But if you feel you have a condition that doesn't fit those classifications, the best place to start checking is the battery. In fact, it always pays to know the condition of the battery before you test circuits and units.

HOW TO CHECK THE BATTERY

Battery connections must be clean and tight. Even when a connection *looks* tight, you'd better tighten the cable terminal to make sure it is tight. And, if there's corrosion, disconnect the cables from the posts. Dip a stiff brush into a soda solution and clean off all corrosion from terminals and posts. Reinstall the terminal, tighten it, and apply a coating of petrolatum.

Specific Gravity. Use an accurate hydrometer to test specific gravity. Remember that the float in a dirty hydrometer tube can stick to the sides and give you a false reading. Alcohol, or warm water and soap



will help keep the hydrometer clean. A fully charged battery has a specific gravity reading of 1.260. All cells should test the same within 25 gravity points (.025). A battery with a specific gravity reading of 1.225 or less, and all cells reading the same within 25 gravity points, must be recharged. If a battery varies more than 25 points between any two cells, it should be recharged and tested for capacity before it's discarded.

Remember that specific gravity of the electrolyte will vary 4 points (.004) with every 10°F. change in temperature. *Subtract* 4 points for each 10° *below, add* 4 points for each 10° *above* 80°F. Correct your readings to 80°F. before making a final interpretation.

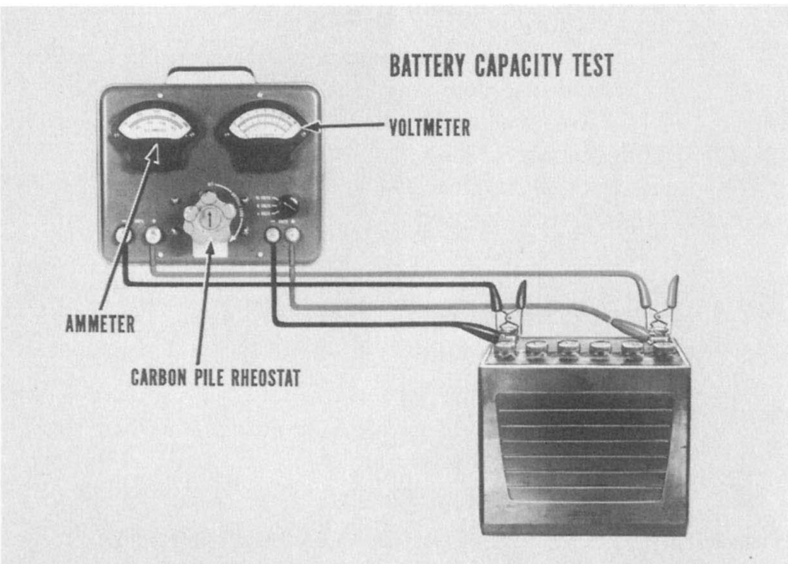
Battery Cell Test. Use the battery cell tester (MT-379) to check each cell. Contact the meter prods—red to positive, black to negative—

and be careful not to connect across more than one cell. Push the prod through the sealing compound to reach the buried link for each cell reading.

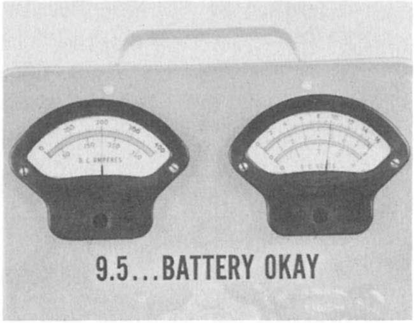
> **NOTE:** Freshly charged batteries with a "surface charge" will cause high, inaccurate readings. So turn headlights on for two minutes to remove this surface charge. Turn headlights off. Wait a few minutes. Then take cell readings.

Cell readings shouldn't vary more than .5 volt between any two cells. If they do, recharge the battery. Then test its capacity before discarding it as unfit for use.

Capacity Test. This test tells you if the battery can deliver sufficient voltage under high cranking loads. To make this test you use an ammeter with a built-in carbon pile rheostat. Turn the rheostat off before you connect ammeter leads to the battery. Connect the leads of a voltmeter to the battery terminals. To be sure the voltmeter clips make good contact, use test pins driven into the posts.



Adjust the rheostat control knob until the ammeter shows 200 amperes. This puts a good load on the battery. Let the battery discharge at this rate for about 15 seconds. Then, with the battery discharging at 200 amperes, read the battery voltage. If it's 9.5 volts or more, battery capacity is okay.



If a battery doesn't pass the capacity test, you'll have to slow-charge and retest it to find out if it can be saved. Another thing, if a battery tests *less than 1.225 or is cold—below 70°F.*—don't make a capacity test because the results would be meaningless. In either case, install a good battery in the car before making any further tests.

Charging the Battery. Slow charging is recommended wherever possible. Slow chargers normally in use can charge both 6- and 12-volt batteries on the same circuit. A 12-volt battery can be considered as equal to two 6-volt batteries, so the charging rate must be adjusted to suit the smallest 12-volt battery on the line. You determine safe slow-charging rates by allowing one ampere per positive plate per cell. All batteries have one less positive plate than they do negative plates, the number of positive plates in an 11-plate battery equals:

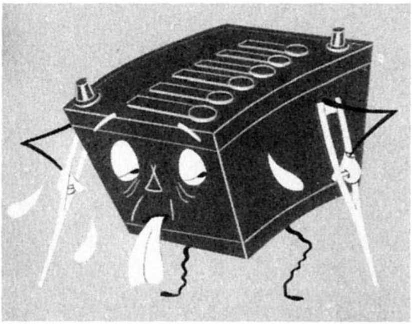
$$\frac{11 - 1}{2} = 5 \text{ positive plates.}$$

For an 11-plate battery the slow-charging rate is 5 amperes.

Connect the positive charger lead to the positive terminal, and the negative charger lead to the negative battery terminal. As a battery approaches its full charge, each cell will begin to bubble freely. Battery temperature shouldn't exceed 125°F. during the charge. If this temperature is reached, cool the battery down by reducing the charge rate, or by removing it from the circuit. The battery will be fully charged when three successive hourly hydrometer readings show no rise in specific gravity.

Slow-Charging to Remove Sulphation. Sulphated batteries should be charged for a minimum of 24 hours at a maximum charging rate of 4 amperes. As the battery approaches its full charge, check specific gravity at hourly intervals. When there's no rise in gravity for three successive readings, the battery is charged to its peak capacity.

Batteries in New Cars. As you probably know, nothing kills a customer's enthusiasm for his new car like a dead battery. After a new car is jockeyed around a few times between the factory and the dealer, and after it's kept in storage for a while, the battery's apt to be pretty low. So when the car is delivered to the new owner, it pays to make sure the battery is fully charged.



STARTING SYSTEM SERVICE

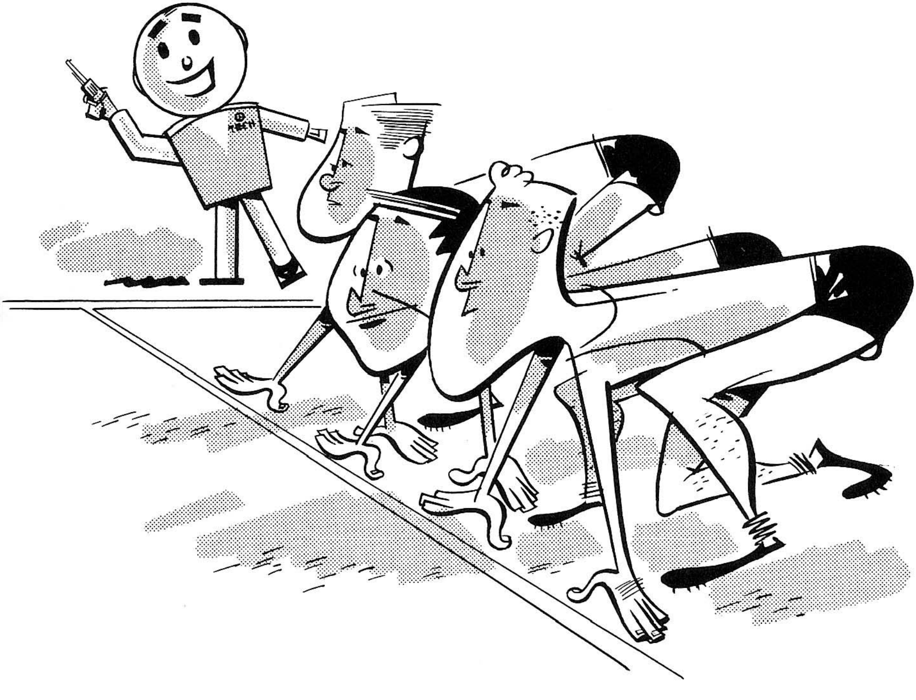
In the basic starting system, the battery, starting circuit, and starter motor must be in apple-pie order for top performance. Whenever they're okay, cranking speed will be good. If cranking speed is slow, you'll have to find the cause.

Slow Cranking. Generally, this can be caused by:

1. Battery not up to specifications.
2. High resistance in the starting circuit.
3. Starting motor internal condition. (This can be mechanical as well as electrical, seized or worn bearings, as an example.)
4. Engine cranking load too high. (Engine too tight, heavy engine oil, etc.)

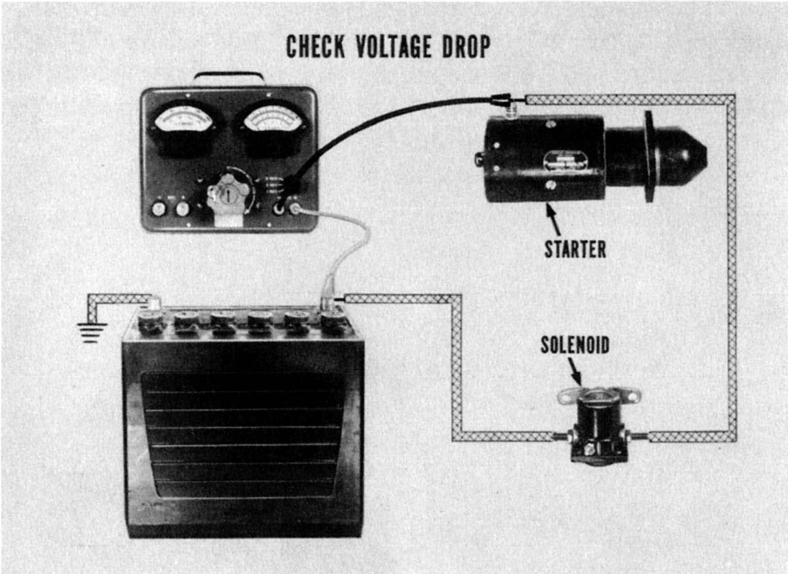
To track down starting system trouble, you'll have to make some preliminary inspections and tests. For one thing, it's smart to check the battery as outlined earlier.

Next, make voltage drop tests on all cable connections in the starter circuit from battery to the starting motor, and from battery to ground. They're easy to make and may save you from removing the starting motor for inspection and bench tests unnecessarily. Clean and tight connections will correct possible points of high resistance.



Checking for Starting Circuit Resistance. Some mechanics find that cranking the engine with the lights on can sometimes provide a clue to where high resistance might be. If the engine doesn't crank fast and the lights don't dim very much, start by testing either the battery or the starting circuit.

Let's assume that we know the battery's checked and found to be okay. The trouble, therefore, has to be in either the starting circuit, or in the starter motor itself.



Starter Cable and Switch Tests. Use a voltmeter to check voltage drop in the starting circuit. But first ground the ignition primary circuit to keep the engine from starting. Connect the ground jumper on the *distributor side* of the *ignition coil.*

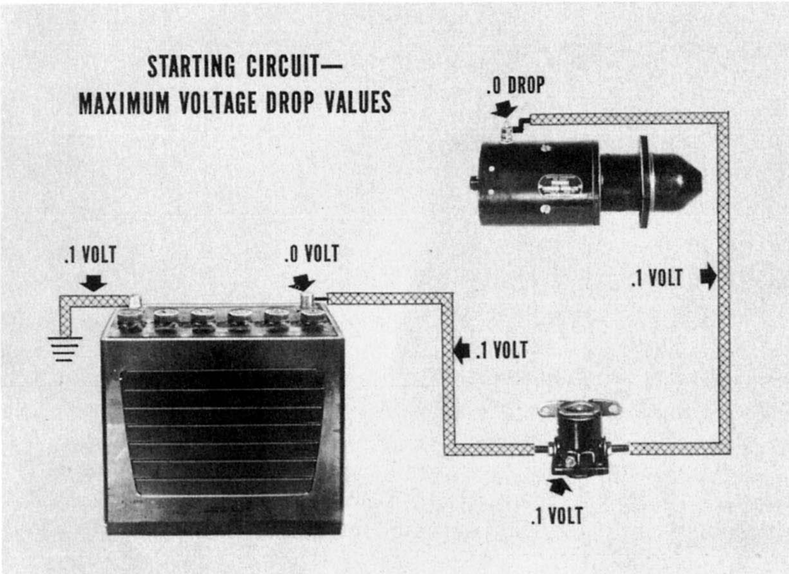
> **NOTE:** If the ballast resistor is on the distributor side of the coil (as it is on some 1957 and earlier model cars), connect the jumper to the *distributor* side of the *resistor*—or, directly to the primary terminal of the distributor.

Next, turn the voltmeter selector switch to the 4-volt position. Then, connect the positive voltmeter lead to the positive battery terminal. Connect the negative voltmeter lead to the starter terminal. The meter will read off scale to the right, but you'll be using the *4-volt scale* to get accurate voltage drop readings.

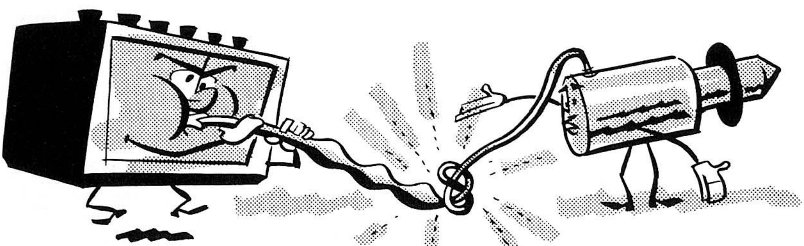
Crank the engine and watch the voltmeter. You shouldn't read more than .3 volt while cranking with this instrument hook-up.

What the Test Means. If voltage drop is .3 volt or less, the circuit is okay. Trouble is in the starter motor and it should be removed for inspection and bench tests.

But if the voltage drop is *more than* .3 volt, there is high resistance in the starting circuit. In a case of this kind, check voltage drop across each cable, across the solenoid starter switch, and across each connection.

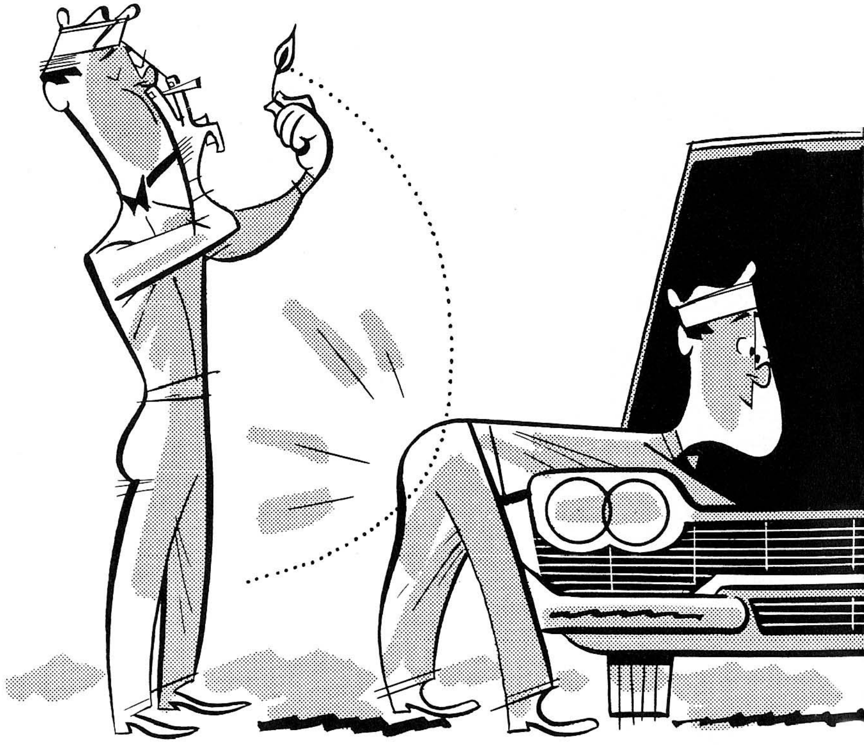


Maximum voltage drop across each part of the circuit should not exceed .1 volt for each cable, .1 volt for the switch, and there should be .0 volt (no drop) at the terminals and connections.

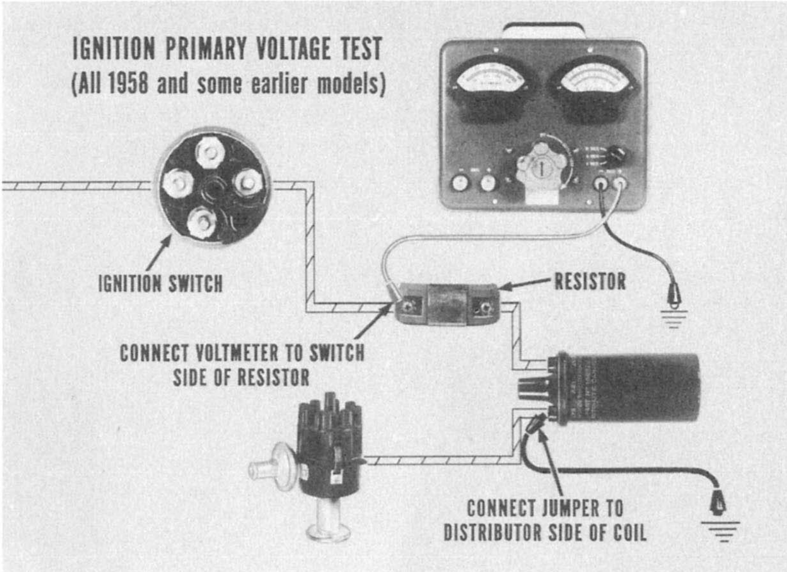


IGNITION SYSTEM SERVICE

Good ignition, remember, begins with good primary voltage to the ignition coil. A voltage test, while cranking, will show you if voltage to the coil is high enough for good ignition. Keep in mind, also, that low primary voltage to the coil can cause hard starting in addition to poor engine performance.



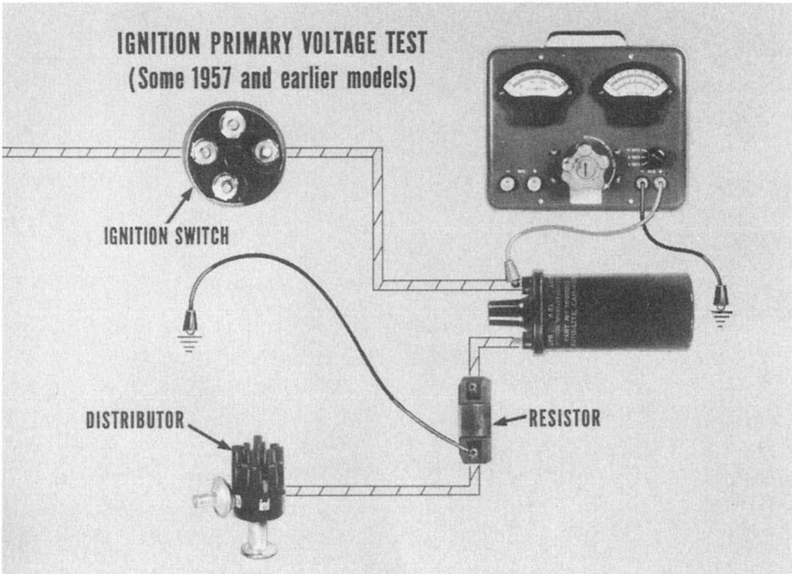
Primary Voltage Test. For this test, use an accurate voltmeter. Follow the instructions that apply to the instrument you're using. Set the voltmeter selector switch at its 16-volt position, and connect the negative lead to a good ground. Do not connect the voltmeter positive lead, however, until you locate the position of the ballast resistor.



On 1958 models, along with some 1957 and earlier cars, the ballast *resistor is between the ignition switch and coil.* As a result, you must connect the positive voltmeter lead to the switch side of the resistor. If you connected the voltmeter to the coil side, the resistor would drop the voltage. That would give you a low-voltage reading that would be misleading. So, whenever the resistor lies between the switch and coil, put the positive lead on the switch side of the resistor.

Next, connect a jumper on the distributor side of the coil to ground out the primary circuit. This keeps the engine from starting during this test. You could pull the high-tension lead from the distributor to keep the engine from starting, but you must ground it. High voltage in an ungrounded secondary circuit can damage the coil, or set off sparks that can cause a fire.

Again, watch out for cars having the resistor on the distributor side of the coil. Some early models were wired this way. On these cars, connect the jumper to the *distributor side* of the *resistor.*

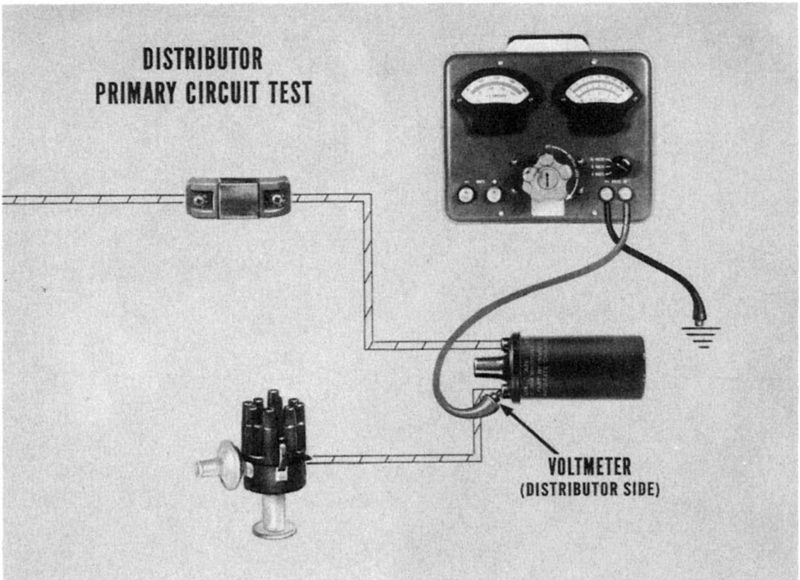


If you connected the jumper to the coil side of the resistor, current would be too high. That's because the resistor wouldn't cut down the current, which would really "French-fry" the ignition wiring.

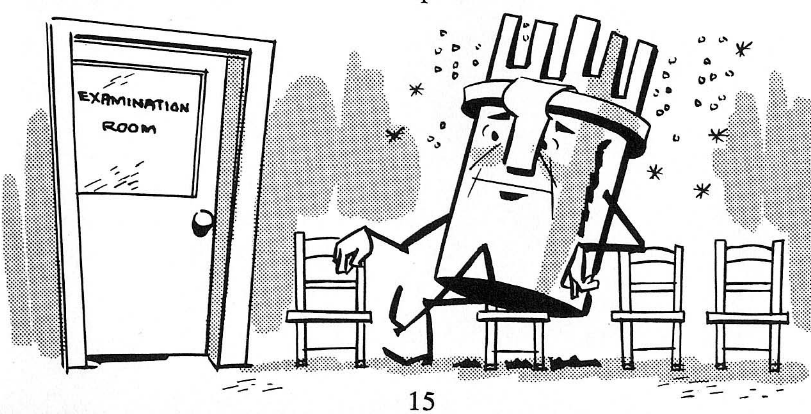
Just keep in mind that when the resistor is on the distributor side of the coil, you connect the voltmeter directly to the coil on the ignition switch side.

Now, once you've connected instruments properly, crank the engine about 15 seconds and watch the voltmeter. Cranking voltage should be 9.6 volts, and cranking speed should be good. If that's what you read, trouble on the car is most apt to be in the distributor. Naturally, you'd use the voltmeter to check for high resistance in the distributor primary circuit.

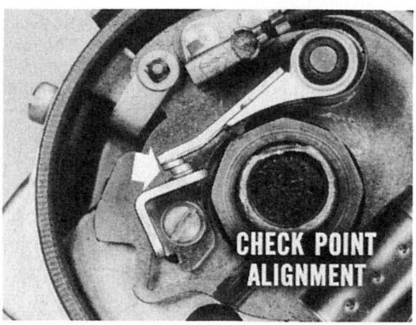
Distributor Primary Circuit Test. Notice that you connect the voltmeter on the distributor side of the *coil*. In brief, just remove the jumper and connect the voltmeter positive lead in its place.



With the ignition turned *on,* and the breaker points closed, read the voltmeter. Voltage drop should not be more than .1 volt. If you see more than .1 volt, you'll know that something's not up to snuff in the distributor. There may be burned points or a loose connection. Since you have made sure the trouble is in the distributor, it should be removed for bench tests and inspection.



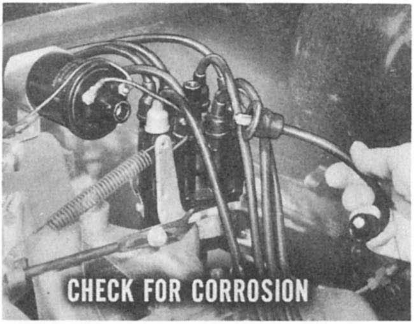
Why Ignition Points Burn. If points are set too close, they'll burn. The condenser won't be able to do its job of soaking up enough of the current to prevent arcing. Oil or grease on the points can also make them burn. So can a defective condenser cause burned points.



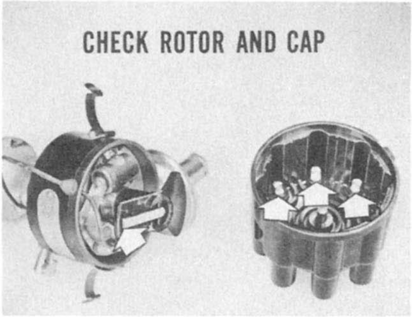
Also, if the points aren't lined up properly, they'll burn on one edge because the reduced contact area won't be able to dissipate heat properly.

In addition, if the voltage regulator is set too high, the distributor points will burn. Don't overlook this possibility. A voltage setting too high can actually cause trouble throughout the electrical system.

Voltage Drop Less than .1 Volt. Now, suppose the voltage drop in the distributor primary is less than .1 volt and there's still ignition trouble. In this case, you'd check the *secondary* ignition circuit. Specifically, you'd check for corrosion at the distributor towers, and at the ignition coil tower.



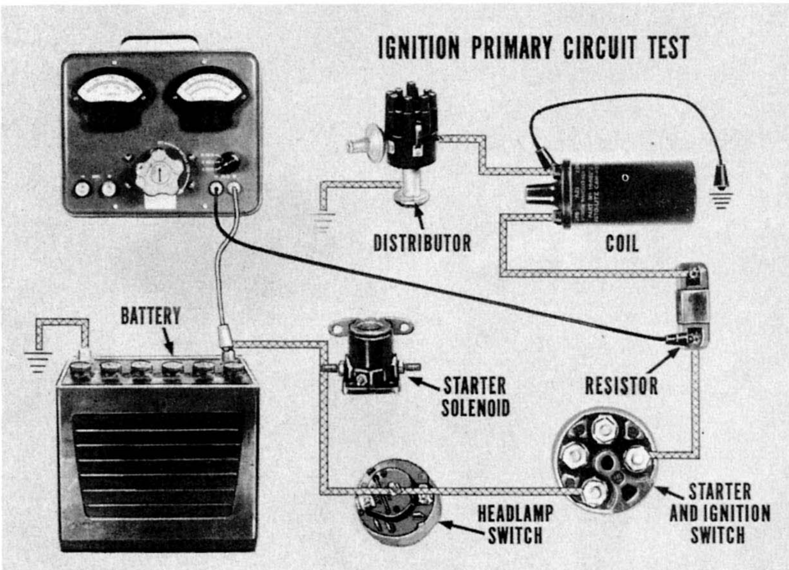
Besides that, you'd check for a burned rotor, or arcing at the terminals inside the cap. If you find those points okay, you'd check the wires and spark plugs . . . burnt electrodes, wrong gap, etc.



Additional Tests—Ignition Primary Circuit. A high voltage drop in the primary circuit will reduce the secondary output of the coil. This leads to hard starting and poor engine performance.

Therefore, when primary voltage is less than 9.6 volts during cranking, look for trouble in the battery or high resistance in the primary circuit. You know how to check the battery, so let's cover further circuit resistance tests.

Voltage drop from the battery to the ignition switch side of the ballast resistor shouldn't be more than .2 volt.



To check voltage drop, set the voltmeter selector switch at the 4-volt position. Connect the positive voltmeter lead to the positive battery post. Connect the negative voltmeter lead to the ignition switch side of the ballast resistor.

> **NOTE:** On some 1957 and earlier models where the ballast resistor is on the distributor side of the coil, connect the negative voltmeter lead to the primary terminal on the ignition switch side of the coil.

Next, connect a jumper from the distributor side of the ignition coil to ground. Using a jumper to ground the coil is usually easier than cranking the engine until the distributor points are closed. Also, the jumper eliminates possible false test readings due to reduced current caused by resistance at the points, wiring, and distributor connections.

Be sure all lights and accessories are turned *off*. Turn the ignition switch *on*. There should be no more than .2 volt on the voltmeter.

Test the ignition switch by turning it off and on several times. The voltmeter should read the same each time the switch is turned on. If it doesn't, ignition switch contacts are burned and the switch should be replaced.

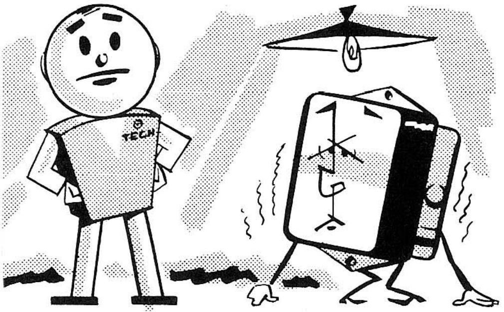
If voltage drop is more than .2 volt, or if there's intermittent ignition trouble, check all wires and connections for tightness. Leave the ignition switch *on* and the voltmeter connected. Move each wire and check each terminal as you watch the voltmeter. If any movement changes the voltmeter reading, you've found the cause of high resistance in the circuit.

CHARGING SYSTEM SERVICE

Generator Regulator. Before testing the regulator, check the battery and circuit resistance. Battery specific gravity should be at least 1.225. If it isn't, install a good battery before making any further tests.

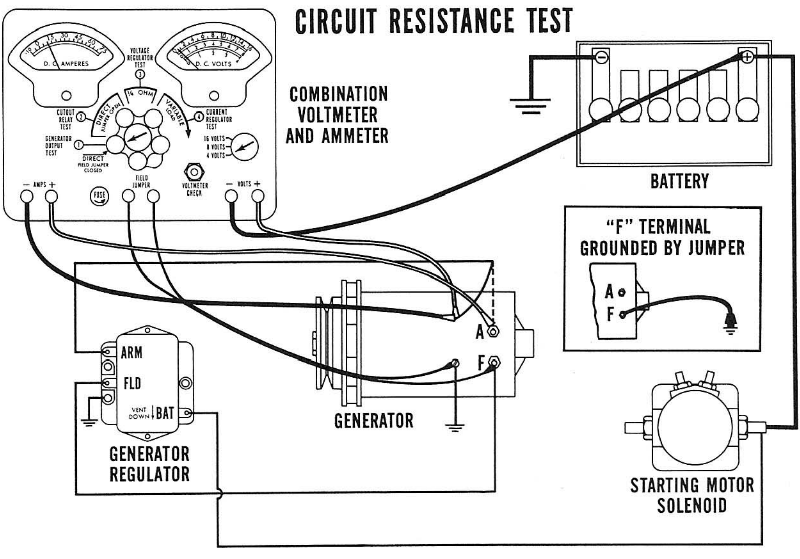
Incidentally, it's wise to disconnect the battery before you connect the test instrument leads. This will prevent any accidental shorts that can damage the instruments or electrical units. Most instruments provide a special extension stud for installation at the battery (*BAT*) terminal of the regulator. This stud simplifies the test connections and also reduces the possibility of shorts.

Circuit Resistance Test (Insulated Side). High resistance in the charging circuit acts on the regulator the same as a fully charged battery. This reduces the charging rate to the battery before it is fully charged. To test for high resistance connect a jumper from the generator field terminal to ground to by-pass the voltage regulator. Next, disconnect the regulator armature wire from the armature terminal of the generator.



Connect both the *negative* ammeter lead and the *positive* voltmeter lead to this armature wire. The positive ammeter lead should be connected to the armature terminal of the generator. The negative voltmeter lead should be connected to the positive battery post. Now, any loss in the test ammeter will not register on the voltmeter. The test instrument shown below contains leads for grounding the "F" terminal of the generator.

CIRCUIT RESISTANCE TEST



Reconnect the battery and start the engine. Slowly increase speed until 10 amperes register on the ammeter. You shouldn't read more than .5 volt on the voltmeter. If voltage reads higher, check for either a bad connection between the voltmeter leads, or for burned relay points. A higher reading, by the way, shows a need for making a point-to-point voltage drop test.

You check voltage drop by moving one of the voltmeter leads back along the circuit toward the other test lead. A sudden drop in voltage indicates trouble between that point and the last point checked. Usually, it calls for simply cleaning and tightening connections, repair or replacement of faulty wiring, or cleaning of relay points.

Circuit Resistance Test (Ground Side). Test the ground side of the cutout relay as outlined above except that you connect the negative voltmeter lead to the generator frame. Connect the positive voltmeter lead to a test pin driven into the negative battery post. Voltage drop should be less than .1 volt. With a good ground circuit the voltmeter pointer should barely move from the zero line.

In case of excessive voltage drop, inspect the ground connections between the battery and the engine. Check for loose generator mounting bolts, painted, or rusty surfaces between the generator mounting and the engine.

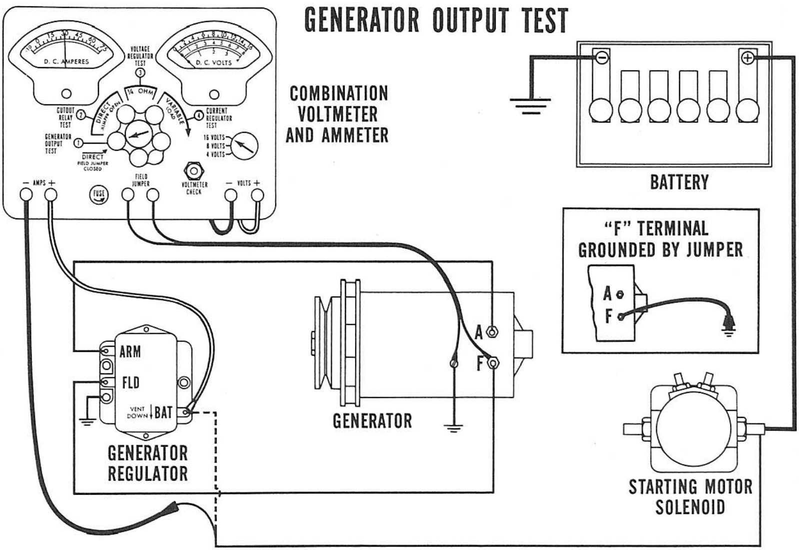
Circuit Resistance Test (Regulator Base to Generator). Here you connect the voltmeter between the regulator base and generator frame. With the engine running and the generator charging 10 amperes, voltage drop should be very slight. More than just a slight movement of the meter pointer means there is too much resistance in the ground circuit.

Circuit Resistance Test (Accessory Load). Connect the voltmeter from the generator frame to the car body. Turn on all accessories. Here again, voltage drop should be very slight. If there's more than a tiny movement of the voltmeter pointer, clean and tighten the engine ground strap. If there is no ground strap, install one from the car body to the engine.

NOTE: After testing for circuit resistance, you should test the generator output. Use the same test instruments and connect them as explained below.

Generator Output Test. A standard equipment generator up to specifications will reach its fully rated output at 1500 to 1800 r.p.m. You can check this output by connecting an ammeter in series with the charging circuit. Use a jumper to ground the field (F) terminal of the generator. This takes regulation out of the circuit. Connect a tachometer to the engine to register engine speed. If this test follows the circuit resistance tests you can use the same voltmeter and ammeter connections. Otherwise remove the wire from the battery (BAT) terminal of the regulator and connect the positive ammeter lead in its place. Connect the negative ammeter lead to the terminal of the wire removed from the regulator.

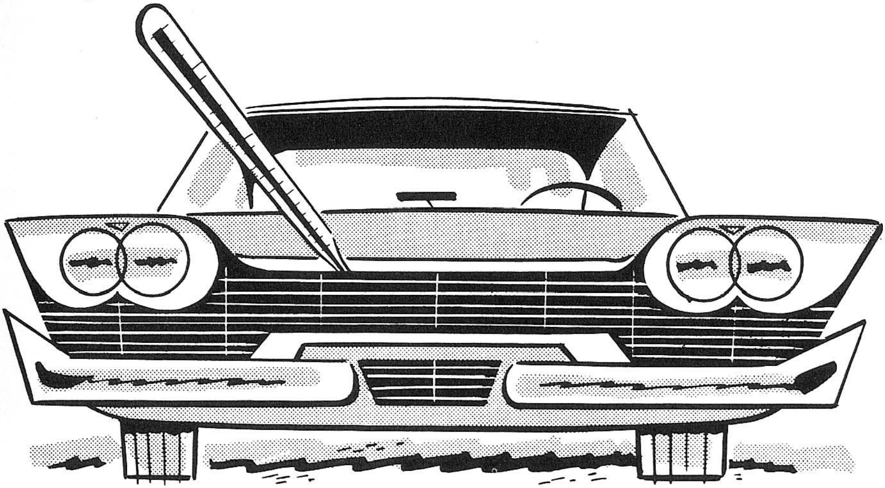
GENERATOR OUTPUT TEST



Start the engine and gradually increase engine speed. The standard equipment generator should produce the rated output at 1500 to

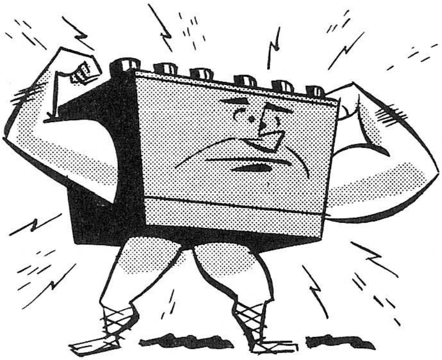
1800 r.p.m. If output is low, or erratic, double-check for drive belt slippage. If the drive belt is okay, remove the generator and inspect the brushes for good contact and length, the commutator for wear and cleanliness, or internal wiring for opens or shorts.

Normalizing the Regulator. Once you've tested for circuit resistance and generator output, you're ready to test the voltage regulator, current regulator, and cut-out relay in that order. But before you do this, you have to normalize the regulator. "Normalize" merely means bringing the regulator, generator, and entire circuit up to operating temperature.



Use the same connections you used in testing generator output. Start the engine and adjust speed until the ammeter reads 10 amperes. Run the engine this way for about 15 minutes to normalize the charging system.

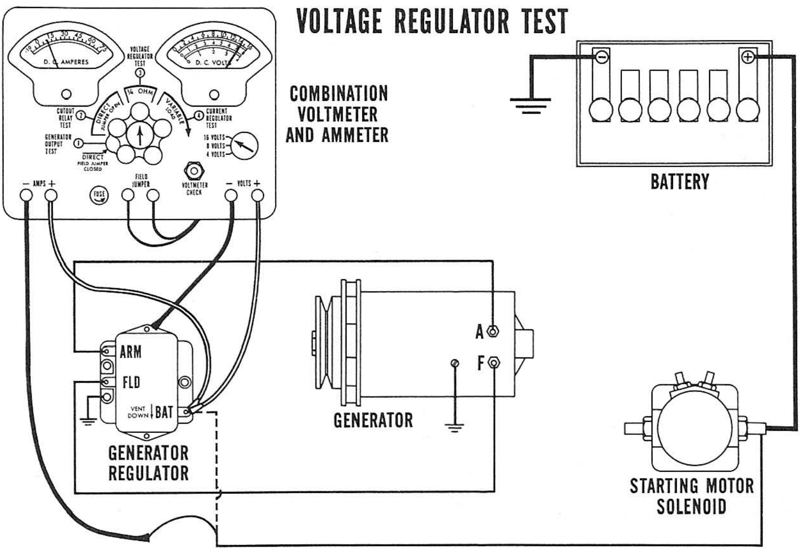
> **IMPORTANT NOTE:** Between *each* test or adjustment, cycle the regulator by reducing engine speed low enough for the cut-out relay points to open. This is very important. In some cases, you may have to stop the engine momentarily to make sure the relay points have opened.



The Voltage Regulator Test. To make this test, a ¼-ohm resistance must be put in series with the charging circuit. This causes the battery to appear fully charged to the regulator and forces the voltage regulator to operate so that its adjustment can be checked.

Some instruments, such as the one illustrated, have a built-in ¼-ohm resistance. To connect an instrument of this type, remove the wire from the battery (BAT) terminal of the regulator. Connect both the positive ammeter lead and the positive voltmeter lead to the battery terminal (BAT) of the regulator.

Connect the negative ammeter lead to the terminal of the wire removed from the battery terminal of the regulator. Connect the negative voltmeter lead to ground at the regulator base.



Start the engine and let it run at 1500 r.p.m. Take temperature readings with the regulator cover in place. Hold an accurate thermometer 2″ from the cover and see if the voltage readings follow those listed in the following table:

TABLE I. VOLTAGE SETTINGS BY TEMPERATURE

TEMPERATURE	50°	60°	70°	80°	90°	100°	110°	120°
VOLTAGE	14.7	14.6	14.6	14.5	14.4	14.4	14.3	14.2

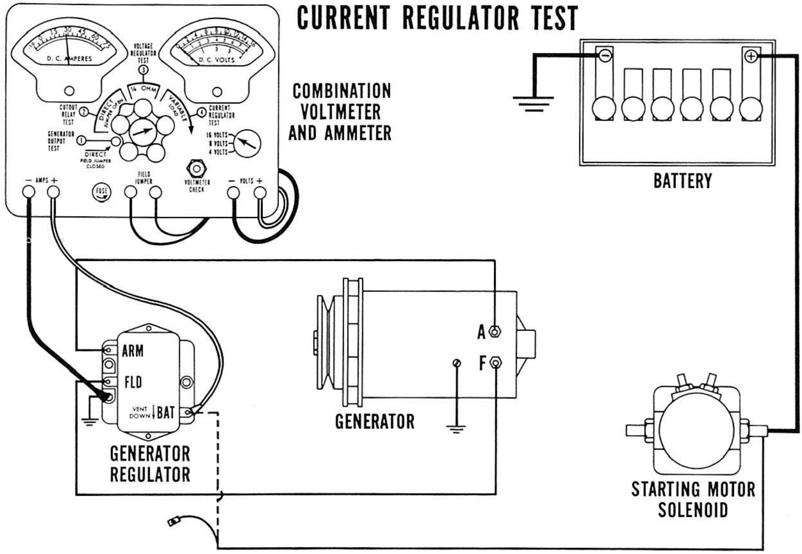
CAUTION: Set voltages accurately. A voltage set more than .3 volt *higher* than that specified may cause excessive burning of points, bulbs, excessive use of battery water, or other damage. A voltage set more than .3 volt *lower* than that specified may not keep the battery adequately charged.

If an adjustment is needed, decrease engine speed to idle. Remove the regulator cover. Bend the *lower* spring hanger of the voltage regulator *down to increase* voltage. Bend the hanger *up to decrease* voltage. Replace the cover. Increase engine speed to 1500 r.p.m. and recheck temperature and voltage readings.

The Current Regulator Test. In addition to normalizing the charging system, the generator must be operated at its rated output for 15 minutes. You do this by running the engine at 2000 r.p.m. and adjusting a carbon pile resistance unit connected across the battery until the ammeter registers the rated output. The test instrument shown in the hook-up illustrated has a built-in variable resistance. It can be adjusted (with the battery wire disconnected) so that the resistance appears as a discharged battery to the regulator. This forces the current regulator to operate so it can be tested and adjusted if necessary.

Remove the wire from the battery terminal of the regulator and *make sure it doesn't short against a ground.* Connect the negative ammeter lead to ground at the regulator base. Connect the positive ammeter lead to the battery terminal of the regulator. No voltmeter, or field jumper connections, are needed for this test.

CURRENT REGULATOR TEST



Start the engine and increase its speed to 2000 r.p.m. Adjust the rheostat (variable load) until the current regulator settles at a steady ampere output. This should meet the following specifications within plus or minus 2 amperes. Temperature should be taken 2″ from regulator cover.

TABLE II. CURRENT REGULATOR SETTINGS BY TEMPERATURE

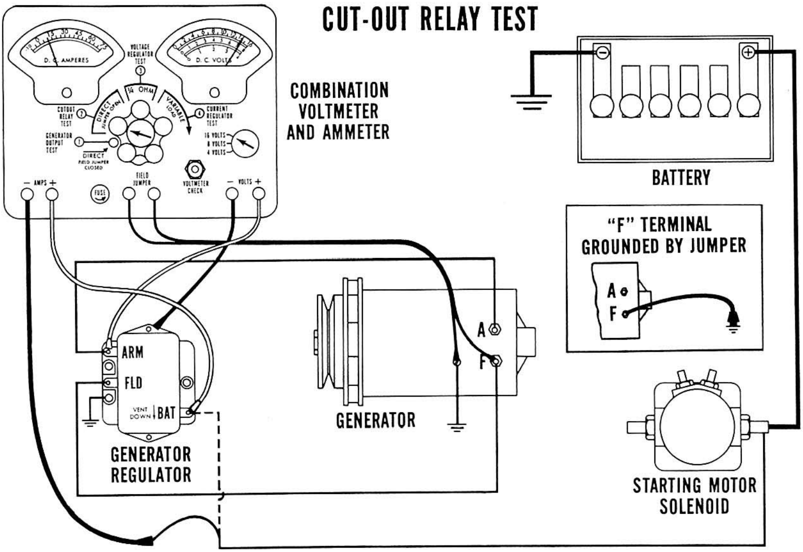
TEMPERATURE	50°	60°	70°	80°	90°	100°	110°	120°
AMPERES	27	26	25	24	23	22	21	20

If an adjustment is required, reduce engine speed to slow idle and remove the regulator cover. Bend the spring hanger *down to increase* current output. Bend it *up to decrease* the output. Recheck current regulator operation after adjustment.

Cycle the current regulator as you cycled the voltage regulator before you go ahead with the cut-out relay test.

The Cut-Out Relay Test. Connect the ammeter between the regulator battery terminal and the battery lead wire. Connect the voltmeter from the regulator armature terminal to ground.

CUT-OUT RELAY TEST



If this test immediately follows the voltage and current regulator tests, you won't have to normalize regulator temperature. But if the regulator's cold, you'd better normalize it.

Start the engine and adjust speed to a slow idle. Rotate the variable resistance control knob to its *full-resistance position*. Then, slowly rotate the knob *toward the no-resistance position* and carefully watch voltage readings.

The cut-out relay points close when the voltmeter pointer jumps back slightly. Closing voltage is the highest reading reached just before the pointer jumps back and should read from 12.6 to 13.6 volts.

Continue to turn the knob toward the no-resistance position and watch the ammeter. If a charging rate of 10 amperes isn't shown, increase idle speed slightly until you do read 10 amperes.

Next, slowly rotate the control knob toward the *full-resistance position* and observe the ammeter. The pointer will drop toward zero, and beyond, and then suddenly return to zero. The discharge amperes noted will be reverse current required to open the cut-out relay points. The points should open at 3 to 5 amperes discharge.

If an adjustment is needed, bend the *lower* spring hanger *down to increase* closing voltage. Bend it *up to decrease* the closing voltage.

Now, if closing voltage is okay, but the opening discharge amperage is more than 5 amperes discharge, the relay air gap is probably wrong. In a case like this, remove the regulator and readjust the air gap as outlined in the shop manual for the car you're working on.

> **NOTE:** After each adjustment, make a complete retest so you can determine the new values of the closing voltage and the discharge current needed to open the relay contacts. Be sure the regulator cover is in place when you make the test.

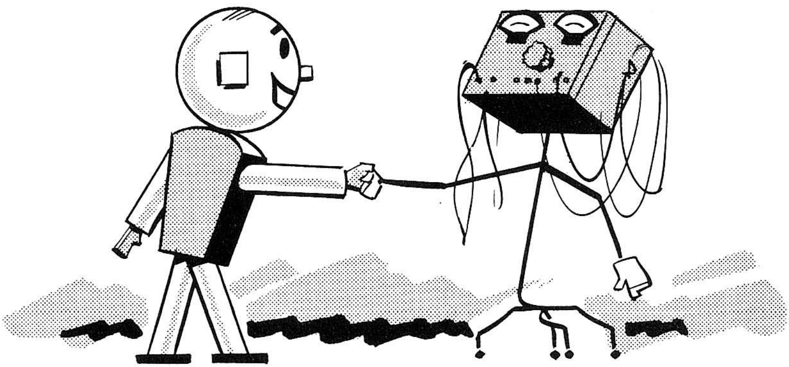
Special note: Remember that these test specifications cover only standard generators and regulators. If a car is equipped with a higher-output or low-speed cut-in generator, be sure to check the generator nameplate and shop manual for specifications that apply.

ELECTRICAL TEST SPECIFICATIONS CHART

SUMMARY

When it comes to electrical service, test instruments really earn their keep. That's because trouble-shooting with voltmeters, ammeters, and a resistance unit usually prevents unnecessary removal or replacement of electrical parts. Needless part removal is often the reason that "cut-and-try" methods take too long.

So follow the suggestions spelled out in this reference book. They'll speed up your diagnosis of electrical conditions and insure your correcting them properly the first time. This, naturally, impresses customers favorably and continues to build a good service reputation with them.



ELECTRICAL TEST SPECIFICATIONS

12-VOLT BATTERY

SPECIFIC GRAVITY

Fully Charged .... 1.260 at 80°F.
3/4 Charged .... 1.230 at 80°F.
Unsatisfactory for Tests.......... Below 1.225 at 80°F.

(For all three readings above:) Add 0.004 for each 10° above 80°F. Subtract 0.004 for each 10° below 80°F.

Maximum Variation between Cells .... .025 and all cells must test 1.215 or more

VOLTAGE

Output Capacity Terminal Voltage .... 9.5 Volts Minimum
With 200-ampere load applied for 15 seconds

STARTING CIRCUIT

RESISTANCE

Each Cable .... 0.1 Maximum Voltage Drop

Each Switch........... 0.1 Maximum Voltage Drop

Terminals .... Zero Voltage Drop

IGNITION CIRCUIT

PRIMARY VOLTAGE

9.6 Volts while Cranking

RESISTANCE

Ignition Switch Side .... 0.2 Maximum Voltage Drop

Distributor (Ground) Side .... 0.1 Maximum Voltage Drop

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Terminals ....
Zero Voltage Drop

IGNITION CIRCUIT

PRIMARY VOLTAGE

9.6 Volts while Cranking

RESISTANCE

Ignition Switch Side ....
0.2 Maximum Voltage Drop

Distributor (Ground) Side ....
0.1 Maximum Voltage Drop

CHARGING CIRCUIT

RESISTANCE

Insulated Side .... 0.5 Maximum Voltage Drop at 10 Amperes Output

Ground Side .... Less Than 0.1 Voltage Drop at 10 Amperes Output

GENERATOR OUTPUT .... 30 Amperes

GENERATOR REGULATOR

Voltage Regulation: 15-min. run at 1500 r.p.m. with 10-ampere Output

F. Temp. 2'' From Cover	50°	60°	70°	80°	90°	100°	110°	120°
Standard (volts)	14.7	14.6	14.6	14.5	14.4	14.4	14.3	14.2
Low Limit (volts)	14.4	14.3	14.3	14.2	14.1	14.1	14.0	13.9
High Limit (volts)	15.0	14.9	14.9	14.8	14.7	14.7	14.6	14.5

Current Regulation: 15-min. voltage run plus 15 min. at 30-ampere Rate

F. Temp. 2'' From Cover	50°	60°	70°	80°	90°	100°	110°	120°
Current **(amperes)**	27	26	25	24	23	22	21	20

(plus or minus 2 amperes at 2000 Engine r.p.m.)

CUT-OUT RELAY

Contacts Close .... 12.6 to 13.6 Volts

Contacts Open .... 3 to 5 Amperes Discharge

CHARGING CIRCUIT

RESISTANCE

Insulated Side............................ 0.5 Maximum Voltage Drop at 10 Amperes Output

Ground Side............................ Less Than 0.1 Voltage Drop at 10 Amperes Output

GENERATOR OUTPUT...................... 30 Amperes

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CUT-OUT RELAY

Contacts Close.. 12.6 to 13.6 Volts

Contacts Open.. 3 to 5 Amperes Discharge

RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 127

If headlights go out, or dim excessively during engine cranking, look for high resistance that's stealing voltage from the circuit.	RIGHT	1	WRONG
A poor cable connection can cause a partially discharged battery.	RIGHT	2	WRONG
High resistance in the charging circuit acts on the regulator the same as a fully charged battery.	RIGHT	3	WRONG
On '58 models with the ballast resistor between the ignition switch and coil, you connect the positive voltmeter lead to the switch side of the resistor to determine primary ignition voltage while cranking.	RIGHT	4	WRONG
Connecting the voltmeter on the wrong side of the resistor may drop primary ignition test voltage and give you a low reading on an ignition voltage test during cranking.	RIGHT	5	WRONG
If primary ignition voltage while cranking is 9.6 volts and cranking speed is good, ignition trouble is most apt to be in the distributor.	RIGHT	6	WRONG
When checking specific gravity, temperature of the solution isn't too important.	RIGHT	7	WRONG
There's no need to check a battery on a new car being delivered to a customer.	RIGHT	8	WRONG
If a battery fails a capacity test, slow-charge and retest it to find out if it can be saved.	RIGHT	9	WRONG
Capacity tests are especially valuable when a battery tests less than 1.225.	RIGHT	10	WRONG

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