

# Troubleshooting the Ignition System

*In my From My Perspective this month, I alluded to the fact that on a recent old-car tour we had more than our share of problems. One of the problems occurred to that self-same Dodge that narrowly avoided an accident. On the same road, although about ten miles farther along, the Dodge pulled off the road onto the shoulder. The engine had just died.*

*One of the group's members, Gary Johnson, along with a number of others, stopped and tried to diagnose the problem. It turned out to be one of no spark; a bad coil. The early 1920s' Dodges used a 12-volt ignition system (yes! factory original) and Gary had 'hot-rodded' his Model T Ford to 12 volts and just happened to have a spare coil.*

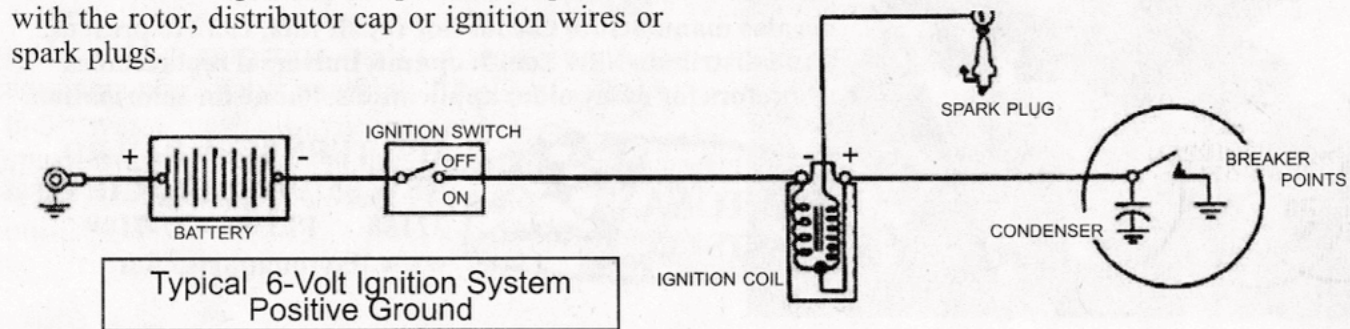
*Below, Gary summarizes what he did and how to troubleshoot difficulties with the ignition system.*

## Troubleshooting the Ignition System

by Gary Johnson

The first check of the system should be to remove the distributor cap, remove the high voltage wire that comes from the center terminal (tower) of the coil and place that end near a clean ground, turn on the ignition switch and open and close the points to observe and listen for any sparking as the points open. If the points are open, you can short the points or terminals with a screwdriver.

If you get a good spark from the wire coming from the coil-to-ground, the problem is probably with the rotor, distributor cap or ignition wires or spark plugs.



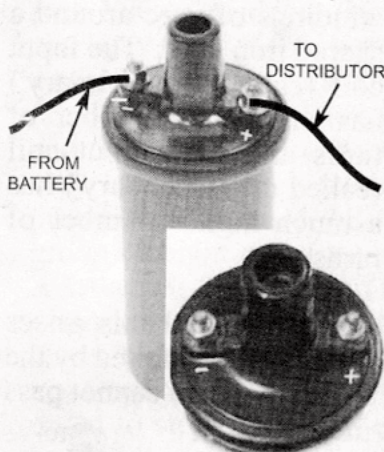
Make sure that there is proper voltage from the battery to the ignition coil. Make sure that all connections are good and that all the surfaces are clean and corrosion-free. If there are fuses in the circuit, be sure that they are not blown and have electrical continuity. Verify that the points are opening and closing, and there are no shorts to ground, or a shorted condenser. Test the coil with an ohm meter or continuity tester to look for an open or shorted coil. The information that follows will help you make those tests.

If there are no signs of sparks, check the primary circuit as follows:

To properly troubleshoot the system you will need a volt/ohm meter, and you will have to understand how to measure voltage and resistance. (See article [How to Use an Electrical Meter](#) beginning on page 36 of this issue.) Remove the distributor cap, and have a friend watch the points as you 'bump' the engine over. The points should open as the rubbing block reaches a high spot on the distributor cam, and they should close - that is, make contact with each other - when the rubbing block comes off the high point of the cam.

Turn the ignition switch to ON and measure the voltage-to-ground of the battery side of the coil. If the coil is installed properly, the polarity of the hot side of the battery will go to the appropriately marked terminal. If the electrical system is Positive-Ground, then the 'hot side' is Negative. The wire from the battery (or probably from the ammeter) will go to the negative or '-' terminal of the coil. If the electrical system is Negative-Ground, then the 'hot' wire will go to the '+' terminal. The voltage measured should be very close to the actual battery voltage. (If the system is 12-volts with a resistor, the voltage with the points closed will be a few volts less than the battery voltage.)

With the ignition switch ON, measure the voltage (set your meter to read the scale just higher than the battery voltage. In many cases it will be 20 volts.) from the distributor side of the coil to ground. With the points closed, the reading should be very low, typically less than 1 volt. If the voltage is close to battery voltage, the points are not closing, they may be dirty, or there may be a broken wire from the coil to the distributor.



With the breaker points open (you can manually open them by inserting a piece of cardboard about the thickness of a matchbook cover between the points. This will act as an insulator. Be sure to remove the card-

board after the test.) the voltage should be very close to battery voltage. If not, the points are not open, the wiring within the distributor is shorted to ground, the condenser may be shorted or the coil may have a broken wire internally.

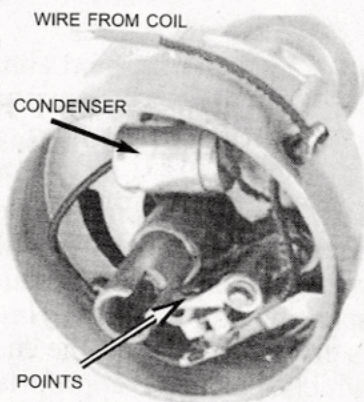
**Test for open coil windings:** Turn the ignition switch to OFF. Disconnect the wire from the distributor to the coil. Use the ohm meter to measure the resistance of the coil '+' terminal to coil '-' terminal. The reading should be on the order of 2 to 4 ohms. Next, measure the resistance from the secondary circuit tower to either of the other terminals of the coil. The resistance should be between 9,000 - 10,000 ohms. Reconnect the wire.

**Test for a coil short to ground.** Turn the ignition switch to OFF. Disconnect the wires from the coil. Measure the resistance from the coil '+' and '-' to the chassis ground. The reading should be infinity ('1' on a digital meter). Reconnect the wires.

**Test the distributor points and condenser for shorts.** The wire from the coil to the distributor must be disconnected. Place one ohm meter lead on the terminal on the distributor that con-

nects to the coil and the other lead to the case of the distributor or the chassis ground. When the points are closed you should have a very low reading (less than 1 ohm).

When the points are open the reading should be very high (close to infinity). If still shorted, disconnect the condenser to check for a short with the ohm meter.



**Condenser:** A condenser checker is needed to test it completely. The best you can do is test it for a short with the ohm meter. Connect the ohm meter to the terminal on the end of the lead, and test to the body of the condenser. A good condenser will measure close to infinity or at least 200,000 ohms. If it is shorted or has a very low resistance, it could be your problem

Usually if the condenser is open and defective you can still get a very weak spark and sparking at the points when they open. To verify that it is the condenser, it is best to substitute it with a new one. (See *What Went Wrong* in this issue.)

**Shorted turns in the coil:** All it takes to stop it from sparking are a few shorted turns on either the primary or secondary windings. A resistance measurement is not accurate enough to detect this problem.

There is very high voltage inside the coil, and it could arc internally. If all the tests are okay and it still doesn't fire, it could still be a bad coil. Substitute a known good one.

There is a good reason for the primary winding terminals to be marked '+' and '-' due to 'Thermionic Emission.' The electrons that make up the spark jump off from a hot piece of metal easier than from a cold piece (spark plug electrode is hot). If the polarity is reversed, you may experience missing and poor performance especially at higher engine speeds.

S.K.