# Understanding the Model A Ignition System

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Firstly the terms; the coil is really a transformer and the condenser is correctly called a capacitor. Together these 2 parts form a “tuned” circuit.

The Model A ignition, like any coil / point system, does not operate as a DC circuit, but as a pulsed circuit because of the points opening and closing, which is more akin to an AC circuit. This is where the coil and condenser become active and can no longer be viewed or measured in pure DC terms. They both have reactance that varies with frequency (engine rpm).

When the points close, current flows through the primary winding and creates a strong magnetic field. When the points open, the magnetic field collapses and creates high voltage in the secondary winding which is more than enough to jump the gaps of the rotor and spark plug. This rapidly collapsing field induces high voltage in the secondary winding and also the primary winding. This can be hundreds of volts in the primary and feeds into the condenser. This high voltage in the condenser then feeds back into the primary. This back and forth current flow between the coil and condenser continues until the points close again and will spark across the spark plug gap until the voltage drops low enough that it can no longer jump the gap. An ignition analyzer (oscilloscope) shows this action very clearly.

This tuned circuit is what gives you the 20 thousand volts to fire the spark plugs. If you don’t believe this, touch the point side of the coil while the engine is running! You’ll find that it isn’t 6 volts (or 12 volts) any longer.

The Model A ignition is wired differently from modern cars that used a coil and points. The coil is always hot; both primary terminals should read battery voltage with the ignition off. With the switch turned on (and the points open) they should still read battery voltage. You can carry this basic test all they way to the movable arm of the points, still reading battery voltage. Only when the points close will the open circuit voltage be shorted to ground and current will flow through the primary side of the coil. If

you open the points with a screwdriver, you should see a spark jump across the points, indicating the primary circuit is operating correctly.

If the condenser shorted out (they rarely if ever fail open) you would not see a spark when you open the points, you won't measure battery voltage at the movable arm of the points, and you won't measure battery voltage at the point side of the coil; all these points will read zero or near zero volts and more importantly, current will be flowing through the coil, which if left in this state may burn up the coil and or discharge the battery.

A coil will usually begin to fail intermittently, and may "heal" itself temporarily when the engine is turned off and the coil cools down. For this reason it is very difficult to troubleshoot a coil without just trying another known, good coil. When checking a coil for spark, pull the wire out of the distributor cap and hold about 1/4" from a head nut.

If you need to buy a new coil, for 6 volts you want one that says no external resistor required. If you need a 12 volt coil make sure you get one with the additional resistance built in. The primary resistance of a 6V coil is 1-2 ohms, a 12V coil should be 3-4 ohms. If the coil is marked + and -, the + side should connect to the points in a positive ground system, for negative ground systems, the – side should connect to the points. The Model A will idle ok with the coil wired either way. Coil polarity is most important when the engine is under load such as climbing hills. Coil testers for polarity and output voltage are available from Model A suppliers.

Changing point gap will change timing. Always set point gap first then adjust timing. When timed correctly with the spark rod fully retarded, the trailing edge of the rotor should be at the #1 post in the distributor body.

If you are checking spark plug operation, short the plug to ground using a screwdriver, never disconnect the plug connector and leave it disconnected; the coil will find its own way to ground and it may arc internally, ruining the coil.