

# Instructions - "Strobo-Spark" Coil Tester - Model CT-1

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## Background

This Tester is designed to functionally test Ford Model T coils used from late 1913 through 1927. This includes both KW and Ford manufactured units that were used in the Ford metal coil box. This coil tester is generally modeled after the functional testing performed by the typical "hand cranked magneto coil tester" (HCCT). Like the HCCT the CT-1 features a strobe wheel to allow the viewing of the coil operation and detection of misfiring often referred to as "double sparking". Where the CT-1 differs is that it tests the coil at a much higher equivalent RPM and also enlarges the "window" of the spark timer testing to show 3 successive "first sparks" as would actually be encountered in an operating Ford engine with magneto AND timer working together.



## Theory of Operation

When running with a magneto and timer on a Ford Model T, the coil sequence of events is as follows:

- 1) The Timer running on the front of the camshaft makes connection to a coil and provides a ground to it that completes the circuit to that one coil.
- 2) The next occurrence of a magneto current pulse that occurs while the timer is connected to that coil will result in the coil current ramping up to the firing point. This "ramp to fire" time (RTF) is ideally equal in all coils to result in accurate cylinder to cylinder timing.
- 3) The coil eventually reaches the firing point and the "first spark" occurs at the coil which ignites the mixture in the chamber and ignition commences.
- 4) The timer continues its dwell time while the magneto subsequently provides 2 or sometimes 3 additional current pulses and these can fire the coil again but the "first spark" is the only one that really matters so far as ignition is concerned since the next subsequent spark occurs at least 22.5 degrees later than the first spark.

The RTF of the coil for this "first spark" is different than the RTF for subsequent sparks. This is because the coil is at rest before the "first spark" but not at rest between subsequent sparks that occur as the result of subsequent magneto pulses. The HCCT uses a train of subsequent sparks to test the coil while the CT-1 uses ONLY "first sparks" to test the coil. The CT-1 does this by disconnecting the coil from the simulated magneto for a time and then reconnecting it again after the coil has relaxed. The spark window is thus showing 3 separate "first spark" occurrences with ample disconnect time between them to allow the coil to relax. This is exactly what would happen in an operating Model T engine equipped with magneto AND timer. Unlike the HCCT which fires the coil repeatedly at slow RPM without a timer, the CT-1 operates the coil with a timer at true engine speed of 450 RPM to thus more closely simulate what actually occurs in the normal operation of the coil. The 3 sparks visible in the spark window are 3 separate "first spark" events. What this means is that what is visible is the first spark that occurs at each of 3 cylinder firings in a row. Between each spark the coil points will completely relax as they do normally when running. This method of testing gives a more true representation of how the coil is working when actually running in the car and also a more accurate measure of its operating current by measuring the average current during these most crucial "first spark" events.

## Additional CT-1 Features

The CT-1 has the ability to test the condition of a coil's internal capacitor. Both the capacitor value (in uFarads) and its leakage can be directly tested.

Finally the CT-1 has the ability to simulate Low, Medium, and High magneto power to help isolate coil problems that only occur under certain magneto conditions.

### Coil Test Procedure:

- 1) Plug the CT-1 power module into a suitable wall outlet. The meter should light up and read zero. Note: The CT-1 will only operate on 120V 60Hz power. It will NOT operate on 50 Hz power.
- 2) Inspect the coil overall condition and make certain that its terminals are clean and smooth.
- 3) Insert the coil into the coil compartment and make certain it is well seated such that all 3 connections are touching the CT-1 spring contacts.
- 4) Place the Meter switch in the "Cap Value" position. The Magneto switch can be in any position.
- 5) Place a piece of paper between the point contacts or hold the points open by some other means and momentarily press the "Press to Test" button.
- 6) Read the value of the capacitor on the meter. A value of .47uF +/- 20% is normal and will show in the meter "cap test" green area.
- 7) Switch the Meter switch to the "Cap Leak" position.
- 8) With points still being held open, momentarily press the "Press to Test" button and read the capacitor leakage value on the meter. A reading near zero is considered OK.

9) Remove the paper from between the coil points.

10) Place the Meter switch in the "Coil Amps" position.

11) Place the Magneto switch in "Med" position.

12) Momentarily press the "Press to Test" button and observe the operate current and spark pattern in the spark window. A good coil should read in the 1.2 to 1.4 amp range and show 3 and only 3 sparks in the spark window. See Figure 1. The spark pattern should show 3 sparks 120 degrees apart around the perimeter of the window. NOTE: It is irrelevant where the 3 sparks occur so long as there are just 3 sparks that are 120 degrees apart. The exact locations of the sparks will change each time the tester is unplugged and may change during coil testing if a power line disturbance



Figure 1



Figure 2

occurs. The only important issue is the appearance of 3 and only 3 sparks 120 degrees apart.

13) Move the Magneto switch to the Low and High positions and note the spark pattern. It should essentially remain unchanged while the coil operate current may change slightly showing a higher current in the "Low" position and a reduced current in the "High" position.

14) Any misfiring or "double sparking" will generally show in the spark window as an erratic pattern as in Figure 2.

For Coil rebuilding/adjustment procedure, refer to video series authored by Ron Patterson. These are available from the Model T Ford Club of America.

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