Model T Ford Register of Great Britain

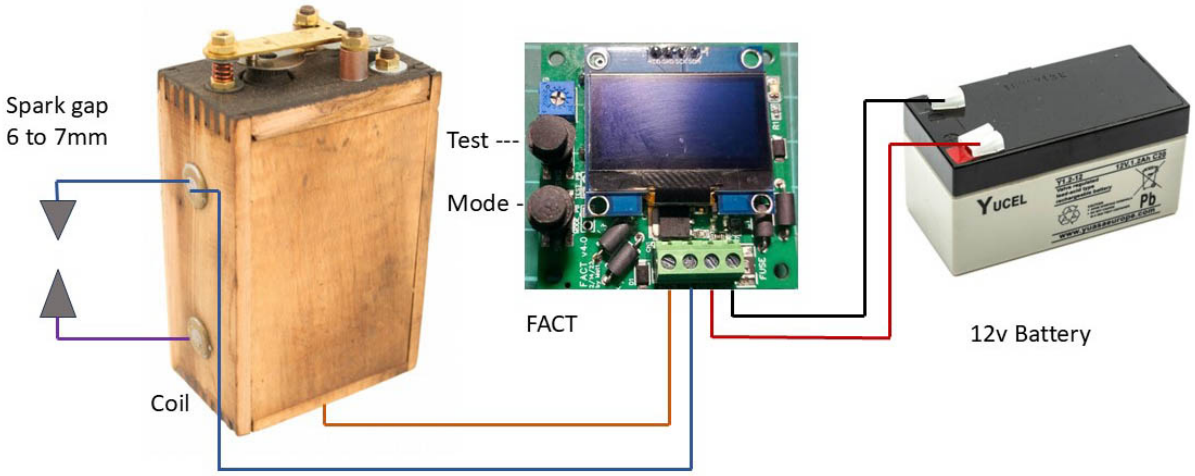
‘FACT’ Guidance Information

FACT (Ford Arduino Coil Tester) uses 21st century technology to help you get the very best from Ford Model T trembler coils. It is supplied as a DIY kit, but with all the electronics assembled, programmed and mounted behind a Perspex plate. It’s up to you to make a suitable box to mount and connect the FACT board and the coil.

We offer first a Summary/Quick Start page, then provide more detail and suggestions

Summary/Quick Start

The FACT board has the Arduino microprocessor installed on its underside, and an OLED screen on top. We supply button extensions and a perspex screen, with screws and spacers. Note that one of the 4 spacers is cut to clear the screen corner. If you wish to use separate buttons, there are connections on the underside for soldering connecting wires.



Here are the connections to be made. The spark gap must be kept away from fingers and the FACT board. A spark plug is not suitable – the gap must be 6 to 7mm. To power the device, we recommend using a 12v battery that is NOT connected to any charger etc . A 1.2Ah sealed rechargeable lead acid battery is convenient and very portable. Ensure correct polarity! The only controls are buttons to select the test mode, and to start and stop each test. It is delicate, so treat it gently!

See pages 5, 6 and 7 for usage notes

A Brief History of Coil Testing

Henry Ford had a very able team of electrical designers, but in the absence of modern tools, they must have had to rely on intuition, luck, and trial and error to perfect the ignition system.

In the Model T era, the only service tool was the HCCT (Hand Cranked Coil Tester), surely the most cumbersome hand tool ever devised. An actual Model T magneto powered the test coil, and its output was seen (if it was correctly adjusted) as a ring of 16 real sparks. Most owners would not have had access to an HCCT, so they just had to rely on getting a coil 'buzzing' - a stream of sparks when powered by DC.

About 25 years ago John Regan in the USA designed and offered the 'Strobospark', a miniaturised mains-powered version of the HCCT. It's no longer made, but it works and has allowed thousands of Model T drivers to experience the joyous difference between coils that just 'buzz', and coils that are properly set up.

In the last decade, Mike Kossor has designed and now offers the ECCT (Electronically Cranked Coil Tester). He started from first principles and produced a micro-computer device that tests coils (and magneto), and uses 'time-to-fire' as the main test parameter. It's excellent…. but costly.

More recently, enthusiasts who frequent the forum of the Model T Ford Club of America have designed a very similar device to the ECCT that can be made (DIY) for a tenth of the cost. Those involved, notably 'Matt' in California and 'Luke' in New Zealand, have generously allowed everyone access and usage rights. They are aware and supportive of our Register project, for which we are most grateful.

The MTFRGB FACT Project

MTFRGB member Tim Law followed the project on the MTFCA forum and then built his own device, The minimum order quantity for boards was 5 so, thanks to Tim, a few UK members have acquired FACT devices. Members' reaction at the 2025 April Fool event when one FACT was demonstrated was so positive that the Committee decided to try to make devices available to members. John Housego followed the path pioneered by Tim Law to get parts to build an initial quantity of 20 assembled, programmed boards.

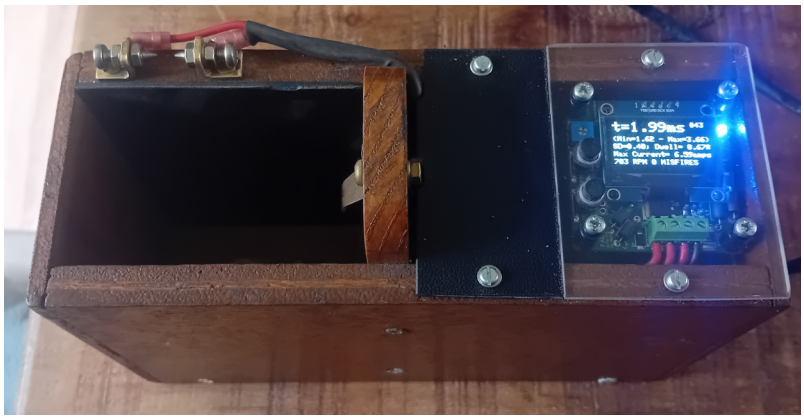
But that is really the easy bit - thanks to John's enthusiasm for the project and willingness to assemble and program the boards.

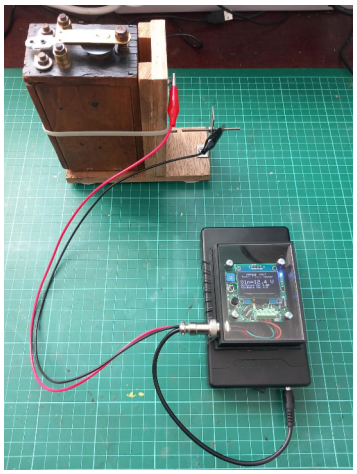
To make a usable tool, some sort of 'box' is required. It has to mount a coil in the same way as the car coil box, but accessible for adjustment; it has to mount the FACT board in a robust convenient manner, and there has to be a spark gap. This is something that most competent mechanics or carpenters can do, but it isn't something that is readily put into production – and to try would delay availability to members.

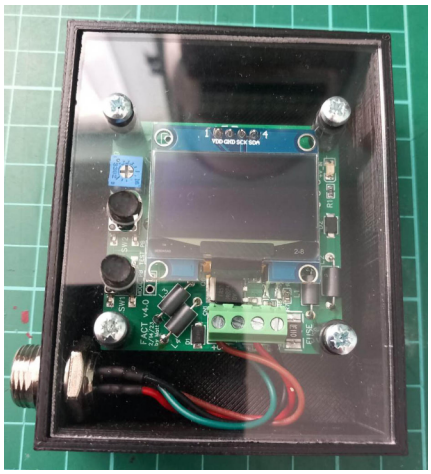
But we have taken one step which is to provide a Perspex mounting plate, and extensions to two tiny buttons on the board which make them easily accessed through the Perspex

Construction Ideas

Richard Wray adapted an existing ‘buzz box’ coil tester to take the FACT circuit in place of the old ammeter. As the perpsex screen is 80mm deep, it fits neatly across the box and the design could have space for a sealed lead acid battery (see page 1) below the FACT. Simple and easy to make. But take care to keep fingers away from the spark gap while adjusting the coil!



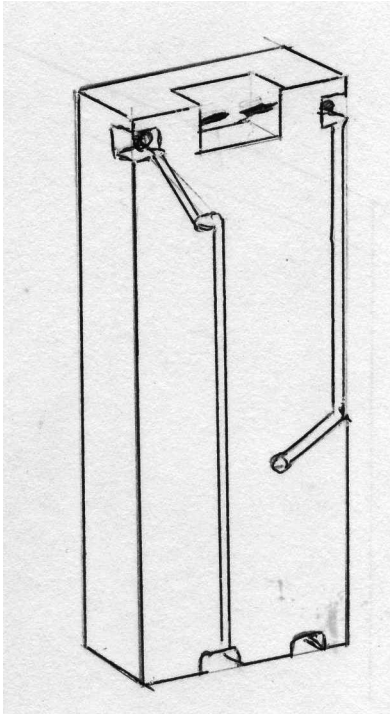




John Housego made a 3D-printed box to make a separate housing for the FACT circuit, with a multi-pin connector to link to a power supply and to a separate coil holder.

Chris Barker made this rather more complicated design. It has separate buttons wired to the connection points that are provided on the FACT circuit board. The spark gap is in a recess at the top of the back, connected by wires buried in the wood. Step by step instructions for a simplified version are given on the next page.

A Suggested Design
- Evolved From The FACT Shown On Page 3



Cut pieces 62mm wide, 12-16mm thick, for base (length 210mm), back (130mm) and central wall (85mm).

Make and fit contacts from flexible springy brass or copper to back and base. 'Tin' the top corners for later soldering of wires. Drill holes through the back for contact wires to reach grooves.

Cut details into the back piece (see right and photo on p3).
- Recesses for spark gap and pin heads
- Grooves to carry wires
- Tunnels for wires under the bottom

Fit spark gap 25mm pins (6-7mm gap) leaving access to their heads.

Screw back to base.

Cut FACT rear mounting groove and bottom wiring tunnels into the central wall. Fit pressure bead to top of the wall Then screw wall to base so that it grips the coil. Check several coils. They vary.

Carefully remove FACT board from perspex and drill front screw hole in perspex, (or use double-sided tape).

Make FACT front support and screw it to the base to be flush with the FACT perspex front edge.

Trim base length to suit.

Make two sides and rear cover from 5 - 6mm ply or MDF. Fit one side. Keep rear wall screws away from HT wires!
Rear cover requires holes for power leads.

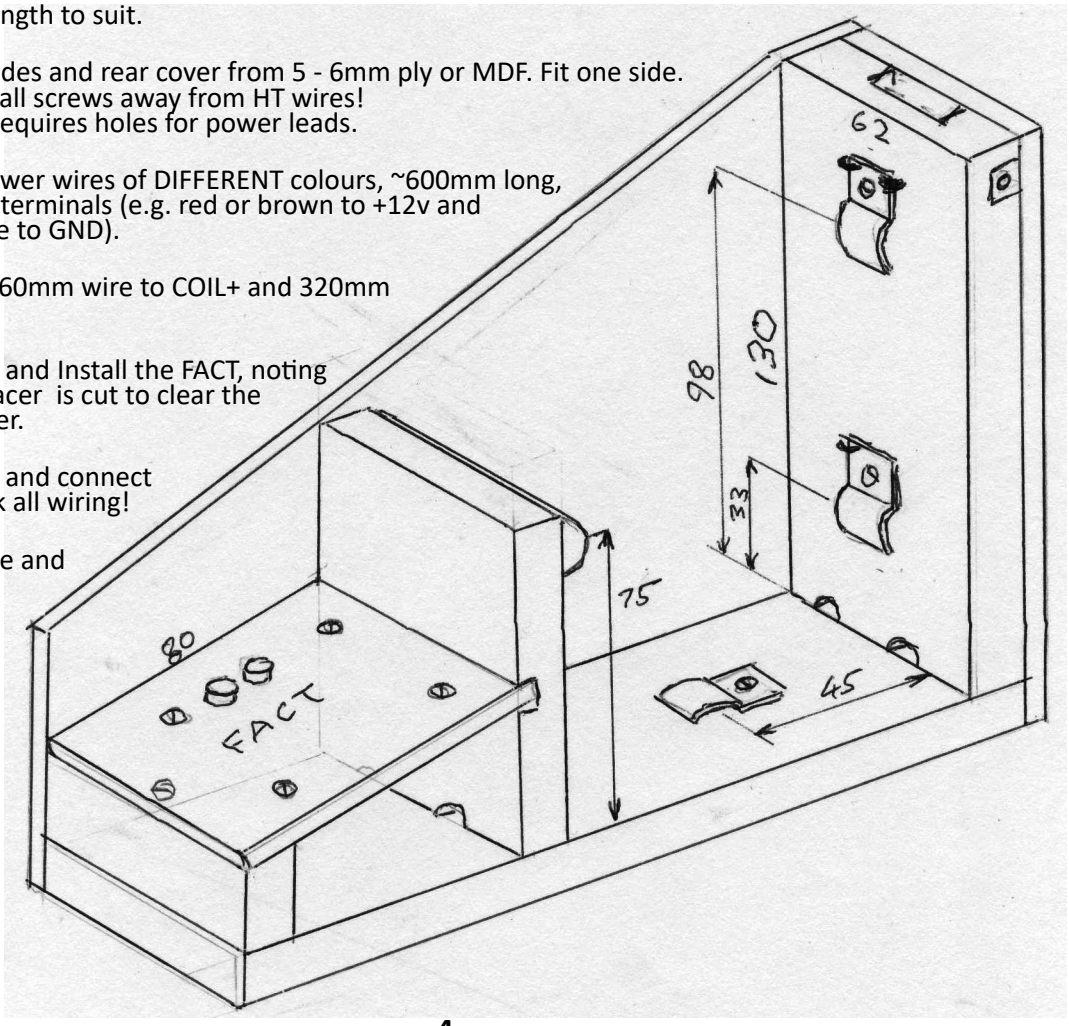
Connect power wires of DIFFERENT colours, ~600mm long, to the FACT terminals (e.g. red or brown to +12v and black or blue to GND).

Connect a 160mm wire to COIL+ and 320mm to COIL -

Reassemble and Install the FACT, noting that one spacer is cut to clear the screen corner.

Route, trim, and connect wires. Check all wiring!

Fit other side and rear cover.



The Model T Coil Function

It's helpful - maybe essential - to understand how the coil works. We have adapted an existing very full explanation of the Model T coil construction and function 'Know Your Coils' - available to down load from the MTFRGB website. Here is a shorter simpler version:

There are two hardened points which rapidly open and close, firing every time they open. The lower one is steel and by bending it at its mounting you adjust the tension - the upward force at the point. See fig 1.

The upper point is mounted on a flexible 'cushion spring'. Its tension (downward force) is adjusted by bending where it joins the upper bridge. See fig 2. The tool shown is sold by US suppliers. The cushion spring can only move a short distance down (~0.005") before being restrained by a rivet head. See fig 3. The bridge is fixed at one end, but the height at the other end is adjusted by a nut and lock nut against a spring.

At rest, the lower point must push the upper contact against the underside of the bridge. See fig 4.

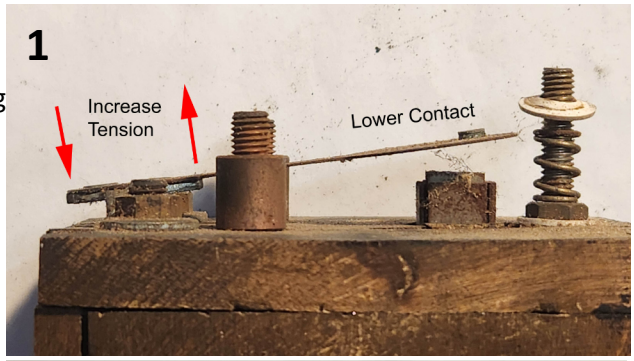
When the car's commutator (timer) switches on the coil, current flows through the coil. Its iron core exerts a growing magnetic force which starts to pull the lower contact down, but the upper contact follows it, so the power stays connected, and the 'charge' in the coil continues to grow.

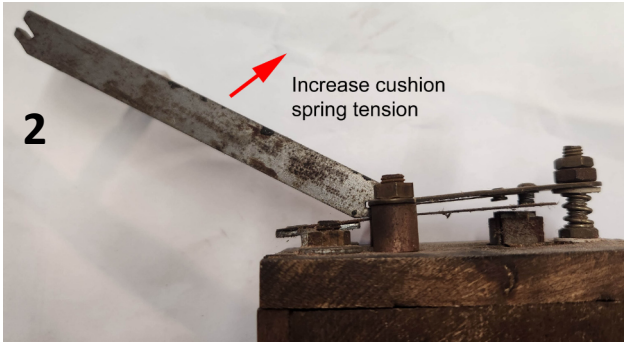
When the cushion spring reaches and is arrested by the rivet head there is an immediate loss of contact, the coil fires and a spark occurs. The lower contact has momentum and continues downward briefly until its tension causes it to spring back. The points reconnect and the process starts again. All this happens about 200 times per second if there is a continuous DC supply. So each cycle is about 5ms, of which the 'time to fire' is about 2ms

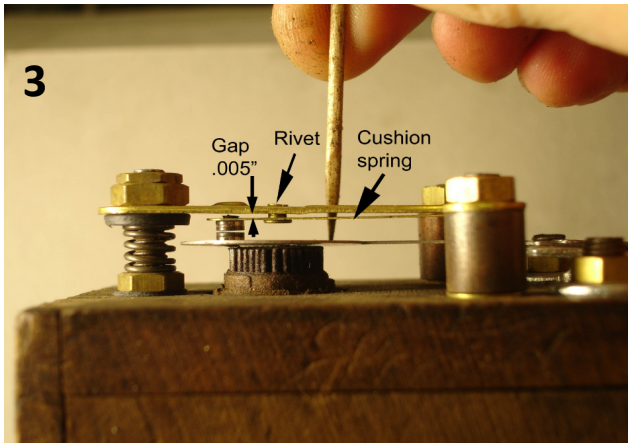
The capacitor is very important as it controls both the charge and discharge of the coil, and protects the point surfaces.

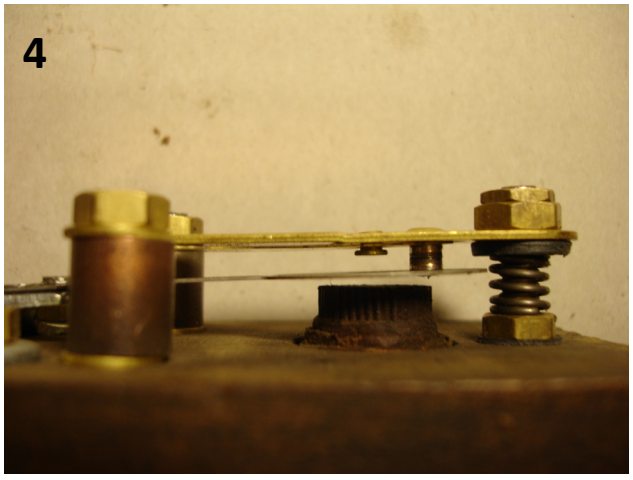
If these tensions and the upper contact gap are not optimum, the coil may generate a very weak early spark, multiple weak sparks or inconsistent sparks. Your aim is to get one strong spark with a consistent 'time to fire' - and to get all your coils the same.

The points are attached by unusual 12-32UNF screws and nuts; the adjustment stud is the more common 10-32UNF.









Adjustment

Ensure correct polarity of the power wires!

The Mode button moves you sequentially through the test regimes shown on the 'cheat sheet' on page 6. For the capacitor tests you must hold the contacts open (or insert paper between the points). For each mode, the Test button (upper button) starts or stops the test.

Do the Capacitor Test first - you want the result framed in red on page 7.
If it fails refer to the more detailed 'Know Your Coils' document available from the MTFRGB website.

Select Live Oscilloscope and test the coil. - you want the result framed in red on page 8. If you don't get that result, but it sparks and the coil parts are clean, you can try adjusting it as described below

If the coil fails badly and appears dirty or corroded, the next task is to strip off and clean up the points and nuts. The points' surfaces can be cleaned up with a very fine stone, file or emery paper. But it seems that only part of the depth of each point is hard. If the points are very thin, you will get them working again, but they will not last.

Check the cushion spring travel - even with new points. It should be about 0.005". If it's too great, you can tap the rivet to close it, but it's very hard to go back if you overdo it! If the cushion spring cannot move at all, the coil will not work properly.

Reassemble the points. The lower one has to be adjusted to meet the upper one accurately. There should be a fibre or plastic washer above the spring, but Chris Barker has found that it is best to just have the nuts above the upper bridge.

The cushion spring needs enough tension to push the upper contact down against the rivet head, but when the coil is assembled, unpowered, the lower contact must push the upper one against the top bridge. Page 5, figs 3 and 4.

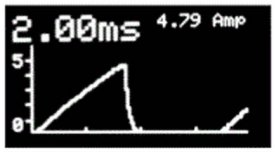
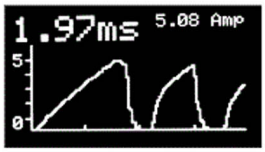
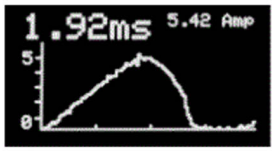
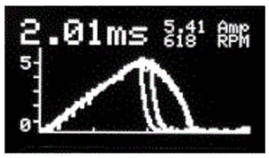
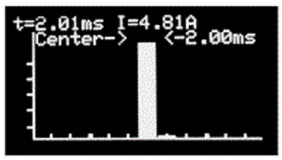
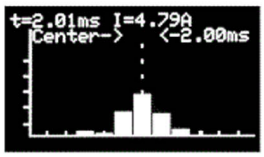
Next, select the Live Oscilloscope mode - you want the result framed in red on page 7.

You use all the following adjustments – here is just a simplified summary; it is a black art which you learn by experiment and persistence.

- Bending the lower contact base down reduces the current taken, and hence the time-to-fire. Bending up increases both. Page 5, fig 1
- The cushion spring tension can be increased if you observe double sparking. Page 5, fig 2.
- The adjusting nut makes finer adjustments to current – and adjustment often eliminates double sparking after the cushion spring is correctly set. Always fit a locknut. There is NO correct points gap figure when open. You may find old advice to set the gap with points open to 1/32". This may be a good start point but ultimately, it has no relevance.

ECCT instructions suggest you aim for a time-to-fire of 2ms. However, some coils set up previously on a Strobospark all took about 2.3ms when tested on the FACT. It doesn't matter as long as all coils are the same. And when the Srobospark 'average' (or RMS) current was 1.3A to 1.4A, the peak current shown on the FACT was consistently about 5.6A, so 5A to 6A is good.

FACT Testing Cheat Sheet

SINGLE FIRE TEST			
	Good waveform. Nice ramp with clean drop off.	**Double Spark** caused by improper adjustment of cushion spring.	**Bad Capacitor** causes faulty waveform.
LIVE OSCILLOSCOPE			
	Good waveform Waveforms overlap with narrow lines and a new waveform is just starting on the far right.	**Double Spark** causes lots of overlapping waveforms after the initial ramp.	**Bad waveform** Lots of inconsistent overlapping waveforms.
BAR GRAPH TEST			
	Ideal It is desirable to have all the time-to-fire measurements in a single 0.1 ms column.	**Okay** If the coil is a bit erratic some of the measurements will fall in the adjacent columns.	**Bad** Very erratic measurements will lead to data in many different bars
MULTIFIRE TEST		t = Average time to fire in milliseconds. SD = Standard Deviation. The smaller the value the higher the precision, so a small value is desirable. Dwell = Degrees of dwell Max Current = Average of maximum currents measured. RPM=The speed may be adjusted using potentiometer.	
CAPACITOR TEST-			
	Good capacitor is in the prescribed range.		**Bad Capacitor** causes faulty waveform.
CAPACITOR TEST- Graphical Analysis			
	Good waveform. Note that the waveform traces the ideal waveform.	**Points Closed.** Points must be opened for testing. (Place a piece of paper in points for testing.)	**Bad Capacitor** causes faulty waveform.

Courtesy of 'Matt in California'

If your coil gives the results framed in red, it's fine.