

A New Approach to an Old Design - Vibrator Ignition

Miro Forest, P. Eng.

A number of years ago , I was troubled by inconsistent ignition on my DisPro – Emily. It has a copper jacket engine and I suspected the timer contacts were not as good as they once were. So I got the flywheel off (with some effort), cleaned and restored the proper geometry, and put it all back together. A little improvement was seen but not much – certainly not as much as I expected.

So I began to suspect the coil. I was told by the previous owner of the boat that the Model T style coil was “one of the best coils he’s ever seen”. But I still was not satisfied. So I went about to figure how the coil worked and to see if there could be something better than what I had.

I made sure that I understood how the coil works in theory and in practice, and what the electrical waveforms internal to the coil system looked like. I also did some historical research and found a patent for the coil design from 1853 which predates the Model T design by half a century. Nevertheless, the concept is sound.

I needed to find 3 basic components of modern design – a high voltage coil, a capacitor to withstand the voltage spikes in the primary circuit and vibrator or trembler mechanism.

I also wanted the ignition system to work off a 12 V DC voltage, since today there are very good rechargeable sealed 12 V lead acid gel cell type batteries that would be perfect for the task of powering a DisPro engine.

The coil was easy – a standard automotive 12V ignition coil with or without an internal resistor – my design takes care of that. These are readily available from car parts dealers and recyclers i.e. junk yards.

The capacitor was easy too – either an automotive type capacitor (sometimes called a condenser) - but for a modern version a 0.1 to 0.2 mfd capacitor with a 600 V rating – preferably mylar film construction. The automotive type can be had at any car parts store or small engine repair shop.

The vibrator – that was the trick. I found that a standard 12V automotive relay with contacts rated at 30 to 40 A DC was available. Again these are available at a car parts store or mail order parts supplier.

Here's a picture of the relay.

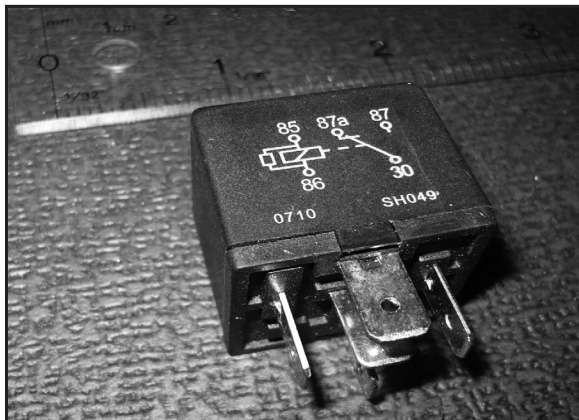
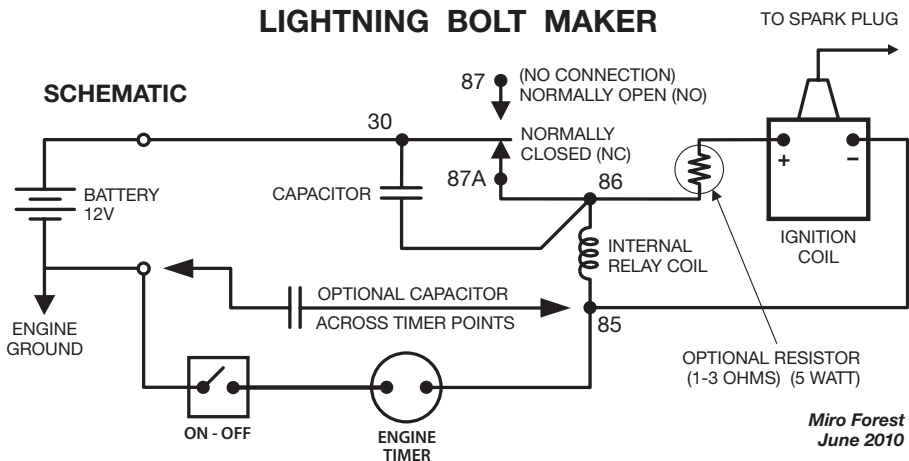


Photo: Miro Forest

Continued next page. . .

I configured the circuit to have the internal relay coil, wired in parallel to the primary of the ignition coil. The internal relay contact that was normally closed was in series with the internal relay coil. This primary circuit was connected in series with the timer contacts and the battery. See this diagram.



When the timer contact at the engine was “made”, the current flowed in the primary circuit, and the internal relay coil was energized. This opened the internal relay contact, which stops the flow of current, causing the relay to return to its normal position which then started the current flowing again – in effect “vibrating”.

Now the high voltage output of the ignition coil is a function of the rate of change of the current in the primary circuit. The faster the current changes the higher the voltage.

Since the mechanical arm of the contact inside the relay is about $\frac{1}{4}$ of the length of the trembler arm of a Model T type coil, and the internal relay coil is much much smaller than the primary winding of the Model T coil, the rate of change of current is much higher for my design. Thus the secondary voltage is much higher.

My design also “buzzes” at a much higher frequency than the conventional coil.

In testing my design, I found that it draws about 0.6 to 0.7 A when buzzing, while a Model T coil draws about 1.2 A. At the same time it produces a much higher voltage for the spark plug and produces a hot blueish white spark across a gap of 0.45 to 0.50 in.

I also calculated how many sparks I get when I am starting the engine and found that I get 7 to 10 of these hot sparks when I crank the engine over. That’s one of the reasons that the engine is so much easier to start now.

At a recent DOA meeting, I spoke to several folks at the lunch about the ignition system and one of them suggested that I ought to write the story for the DOA membership.

This design while not particularly “new” nevertheless has now been successfully used by many old engine boat owners and old stationary engine owners. I cannot take credit for the original design, and offer my version as a tried and true, reliable modern version of the venerable Model T type coil.