Coil Operation (or, the bucket analogy)

by Tom Carnegie

All analogies are flawed. If they were perfect, they would be the thing they were trying to represent. Analogies do serve a purpose though. They can be a handy teaching device if you don't get too carried away. Representing electricity with a hydraulic analogy has been done for years and with some success. As I mentioned before, of course there are flaws, but some things translate well. In this analogy, the coil will be a bucket. A bucket that holds electrons.

In a normal ignition system, the bucket is filled at leisure, and at the correct moment, something triggers it to dump (the points of a distributor, for instance). In a T system, the bucket dumps when it is filled to a certain level. The need is anticipated and the filling operation begins in the hope that it will complete at the correct moment. It supposes that if all four coil's sensing devices are set to dump at the same level, then it will take the same amount of time to fill them. This is roughly true. Unfortunately, for the Montana 500, we don't want anything to be rough. The main reason that the coils dump at different times, assuming that they are adjusted the same, is coil vagaries. In actual fact, as "electron buckets" all coils leak.

It stands to reason that if coils leak they probably leak at different rates. Also the buckets may be shaped differently (different wire size, or more turns of wire, for instance). Some buckets may have wide tops that are easy to fill. Some may have narrow tops that make filling more difficult. The question then becomes, "how to minimize the variations?"

First and foremost is to fill the coil with the biggest hose that you can. The magneto is usually the biggest hose. Furthermore, it is accurately timed. It gives huge blasts of electrons at precisely timed intervals. Even furthermore, it gives bigger blasts the faster the motor goes. As a practical matter, even though more is better, in regard to magneto voltage, good enough is usually good enough. What is more of a problem, but a problem that can be ameliorated somewhat, is mismatched coils. The definition of matched coils are "coils that ramp up at the same rate, given the same voltage". In other words, coils with the same magnetic and electrical characteristics In other words, buckets shaped alike that leak at the same rate.

I spent a good deal of time trying to figure out a way to find four coils with similar properties. I discovered that if you supply a coil with a controlled pulse of electricity, and record the oscilloscope trace, each coil has a unique pattern that is repeatable, to a large degree. A coil "fingerprint" so to speak. I won't go into the details of exactly how I did this operation, but I believe it was successful. There is little use to describe it as most folks don't have an oscilloscope, plus, I'm going to tell you an easier and better way to get four matching coils. Buy four new coils.

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