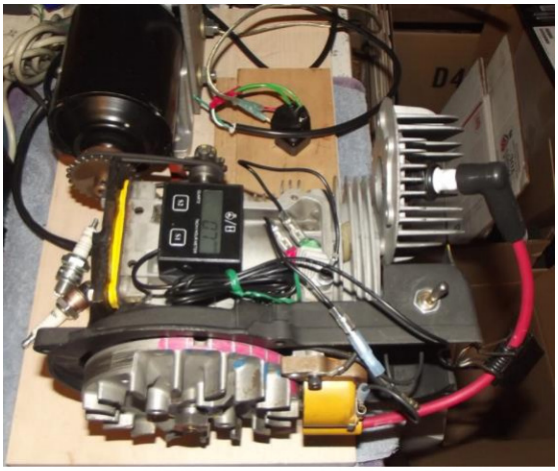
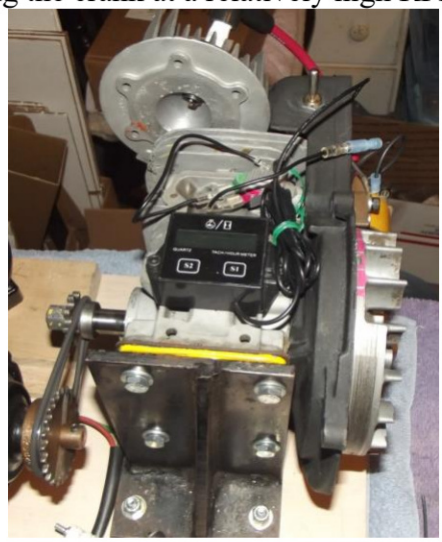
McCulloch Ignition Timing Investigation

I have always been interested in what is actually happening ignition wise in these little high performance engines. I also have been curious about how these little cheap transistorized ignition modules work as well as all the mystery around Maverick spark.
So I decided to build a rig that will help me demonstrate and understand these things in the comfort of my own shop. The rig is basically an Mc91 block, crank, and complete magneto which is connected to an electric motor capable of turning the crank at a relatively high RPM.





As can be seen by the photos the rig has a standard flywheel that has been marked off in increments of 10 degrees before and after TDC. In addition there is a tach, a spark plug for visual feedback and a switch to eliminate the points or module for Maverick spark effect.

I then use a self powered inductive timing light to monitor the firing position on the calibrated flywheel.

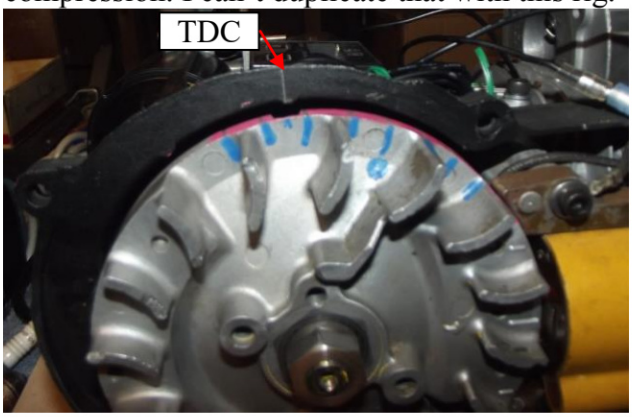


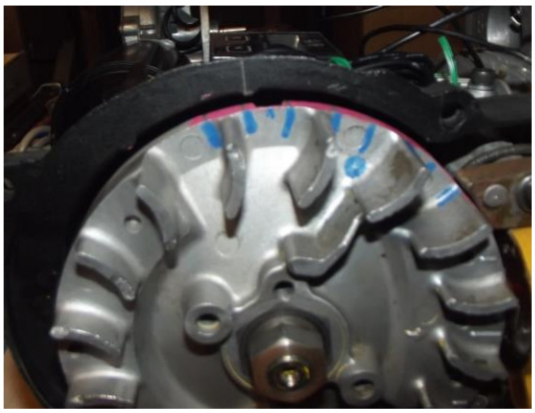


The following are the results I have obtained so far with the rig:

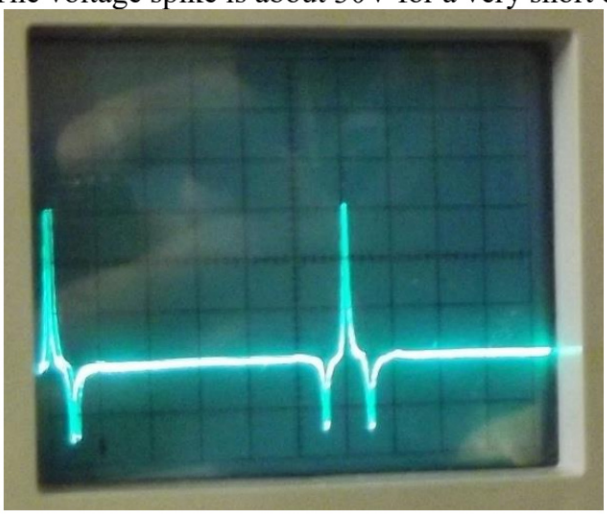
1) Conventional Points/Capacitor operation:

With the points set to open at 25 degrees BTDC, when the switch is thrown to eliminate the points from the circuit the coil begins to fire by the magnetic induction of the coil caused from the flywheel magnets passing by the coil laminations at a sufficient speed to produce a spark. The firing point then moves up to 28-29degrees BTDC. This is the Maverick spark effect, a 3 degree increase in advance. A larger advance would be obtained with a "5 degree" flywheel up to 30-31 degrees BTDC. In addition, the coil begins to "maverick" fire consistently at 2000RPM but I expect it would be a considerably higher speed when the spark is under compression. I can't duplicate that with this rig.





Looking at the coil primary winding at 2000RPM with an oscilloscope (kindly loaned for the project by Dick Teal) The voltage spike is about 30V for a very short duration as seen below.



2) Ignition Module Operation

Using the transistorized ignition module purchased on eBay for about $18, the spark is reliable and occurs at 28degrees BTDC when connected in the correct polarity and fires at 5degrees ATDC when connected in the opposite polarity so you need to be careful to get it set up correctly or the engine will not run or will run very badly. I have been track testing these modules for the past couple years with mixed results. The first was on a stroked Mc10 which

really cranked the RPMs and it worked perfectly. The module was then mounted in the remote points box on the Mc10. Recently I ran one on my grandsons Mc49 and mounted it right next to the coil on one of the mounting screws. It worked well but then failed, the switching transistor blew making the module useless. I also did the same mounting on my Mc100 and ended up with the same result….blown module. I suspect that the electrical interference from the coil may be too much for the module electronics. This past week I took the Mc100 out again with the module mounted away from the coil down on the side cover and it worked OK, I had no problems. So I guess that if you are gonna try one of these little wonders you need to have a back-up set of points onboard in case of module failure. I didn't in either case above so I was dead in the water that day at the track. A drawback of using these modules is that to produce maverick spark you need to use a remote switch to disconnect the module and then you will get a couple degrees of advance whereas if using points, maverick spark can be obtained automatically but lowering the tension on the points spring to make them float at a desired RPM.

Anyway, that is what I have learned so far but if you have any questions or want me to run some specific tests with this rig, just contact me and I'll see what I can do.
Respectfully submitted,
Scott Kneisel
Chuckie72us@yahoo.com