Diary

**Apr 13 2016**

I was not able to get the fancy transistors to work – I am glad I had some IRF840. I was able to shoot the spark using Arduino.

**Apr 18 2016**

Connected the starter relay so now we are not welding when cranking :) Works pretty well. Hooked it up to the handlebar switch with a little light indicating that we're ON.

Got some sparks going: <https://www.youtube.com/watch?v=MUAXOBBR70E> theoretically timed correctly. There's plenty of noise visible on the scope though...

**Apr 19 2016**

Tried with MK02. I was able to pretty much reproduce the ignition functionality BUT… there was lots of missed time slots, plenty of noise (a lot of it caused by having macbook connector to the wall). … AND … 3.3 V ain’t enough to drive IRF840 to fire a spark…

Fabricated some wiring for the VRS sensors (both cam and crank with ground straight to the battery).

**Apr 21 2016**

Built some additional harnesses and ran out of the black wire [sic!, lol]. Figured out the fuel pump relay, tried to start the motor but I could not get it running. After modifying some of the code (mostly by removing ALL computations from the ISRs) it seemed like it wanted to start. Started some spreadsheets to come up with equations for the reference REQ\_FUEL.

**Apr 25 2016**

Just measured the output impedance of the VRS on the cam and crank and it is **550 ohm**.

**Apr 26 2016**

TDC happens IN BETWEEN the crank teeth (in our case on the rising edge of the crank signal).

**Apr 27 2016**

Seems like the signle marker (12) is 90 deg BTDC of the 1st cyl.

**Apr 29 2016**

* I verified theg req\_fuel to be 4.5ms PER cylinder (<http://www.megamanual.com/v22manual/mfuel.htm>)
* The 16 bit timer running in fast PWM mode with 50% duty cycle and variable OCR1A seems like a great choice for the teeth modulation!
* Apprently I have the high-impedance injectors – 13 ohm? The dead time is probably around 0.9ms.}
* I should get the BAT voltage divider referenced to the 5V voltage regulator.
* We need to set the ASE somehow to deal with the “tries to start but dies immediately” issue. Starting at lean and going up.
* We need some sort of prediction for degree timing.
* Threshold rpms for the cranking detection. CRANKING pulse curve.
* For the cranking mode only used cranking advance!
* We need some software signal cleanup

**Apr 30 2016**

I was able to get the MK20 ECU project up and running again – even WITH working semihosting - -specs=rdimon.specs and increased heap / stack size got it done! Now the problem is that board does not start the app when not debugging [bump].

Captured some reference curves using Arduino:



Now I am thinking about wiring a quick generator for this waveform.